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VALUABLE SERIES OF SPECIAL ARTICLES.

With this issue the Review begins the publication of a series of special articles that should prove very interesting to naval architects, draftsmen and foremen in ship yards. The articles will probably number twenty-five in all, appearing in alternate issues and running for about a year. They are being prepared by Geo. H. Wilson, chief draftsman in the office of the superintending naval constructor at the Harlan & Hollingsworth Co.'s Works, Wilmington, Del. Some idea of the intention of the work, which will probably be finally issued in book form, may be gained from the following summary:

The work will be devoted to torpedo boats and destroyers, and will also apply to yachts and like craft.

Two or three styles of the most advanced ideas in construction and details will furnish matter for comparison and suggestion.

The regard for the cost of the work in question will be a main feature.

The best and most practical methods for getting out the work will be dwelt upon.

Some new features in structural work and in details will appear.

The various machines and their usefulness in a new class of ship work will receive considerable attention.

The arrangements and general designs of different boats will be compared.

In dealing with the fittings, the desirability of the latest will be shown, and reasons given for a discontinuance of the one to the advancement of the other.

Hull construction will also deal with the elimination of some of the past methods.

A synopsis of the structural items, and one of the fittings may assist in formulating a better idea of the field to be covered. These headings will, as noted below, be subdivided into their several parts, thus insuring an insight into the principal features of a boat.

Structural headings—Stem, keel, longitudinals, transverse framing, decks, flats and platforms, shell, bulkheads, girders, stanchions, bridge and platforms.

Fittings—Rudder bearer and stuffing box, ventilation, steering gear, pumping and drainage, guard and awning rails and stanchions, hatches and skylights, doors and manholes, coaling scuttles, deck lights, air ports, ammunition rooms and store rooms, mast and rigging, boat davits and stowage, deck coverings and linoleum, etc., ladders and hatch cranes, quarters and living spaces, galley and miscellaneous fittings.

NAMES OF NEW LAKE VESSELS.

Names have been assigned to about half the list of sixty-one vessels building in ship yards of the great lakes. The two steel freighters building at Chicago for C. W. Elphicke and others are to be named W. L. Brown and Mary C. Elphicke. Mr. Brown is president of the American Ship Building Co. and one of the thirty or forty big men of industrial affairs in America. The four steamers building at Chicago for Charles Counselman and others, and which are to engage in through traffic between Chicago and Liverpool, will bear the names Northwestern, Northman, North Eastern and North Town. Four steel freighters of about 4,000 tons capacity, each building at West Bay City and West Superior for D. R. Hanna and others of Cleveland, (two freighters and two tow barges), will be named G. A. Flagg, R. T. Warner, S. D. Warriner and A. W. Thompson. Two steamers for John Mitchell and others, which are nearing completion at the Globe works of the American company in Cleveland, have been named J. J. Albright and Walter Scranton. At this same yard on Saturday last a 5,000-ton steamer for interests represented in the office of Hutchinson & Co., was launched and named J. T. Hutchinson in honor of a successful vessel owner of Cleveland who has been connected with the shipping for probably more than a quarter of a century, but in such a quiet business way that his cheerful personality is known only to those closely associated with him. The memory of the late David Marshall Whitney of Detroit is to be commemorated in the large steel freight steamer building at Detroit for the Whitney estate, and as already announced, names of the planets—Neptune, Saturn, Venus, Jupiter, Mars, Uranus—are to be given to six of the eight steel steamers building for J. C. Gilchrist of Cleveland. Names for the other two steamers building for Mr. Gilchrist have not been selected as yet. A freight steamer of Canadian canal dimensions, building at the Craig works, Toledo, for Messrs. Hawgood of Cleveland, and which is intended for Atlantic seaboard trade, will be named Meteor. A wooden freight steamer recently completed at Green Bay, Wis., for P. F. Thrawl and others, was named Orion.

It is not probable that anything will be done in lake freight contracts for the transportation of iron ore for weeks to come. Important negotiations in New York between leaders in the iron and steel industry will tend to delay preparations for another season of navigation, rather than hurry them. It is the general belief that a successful termination of these negotiations would tend towards improvement along the whole line of interests associated with these big industrial organizations. Within the past week or ten days some improvement has been noted in pig iron and in some of the steel products, so that the lake ship owner has lost nothing thus far by delay in matters pertaining to another year's business. But it is unfortunate, just the same, that he is confronted with an enormous increase in new vessel capacity that will force low margins of profit in the carrying trade, no matter what the volume of business may be.

DEATH OF REAR ADMIRAL PETER A. REARICK.

Rear Admiral Peter A. Rearick of the United States navy was found dead in bed at his home in Washington one day last week. There had been no intimation that the end was so near. He retired in excellent spirits and had been in good health for a long time. He was sixty-three years of age.

Admiral Rearick was born in Maryland. He entered the naval service in 1860, being appointed from the District of Columbia. He was made third assistant engineer, and assigned to duty on the Crusader of the North Atlantic squadron. He served on the Housatonic in the Gulf squadron in 1862, and in 1863 served on the South Atlantic station. In that year he was promoted to the grade of second assistant engineer. The following year, while serving on the Britannia, on the north Atlantic station, he was promoted to first assistant engineer. He saw duty on the ironclad Dictator near the close of the war, and in 1866 was assigned to special duty at Washington. From 1867 to 1869 he was on the Powhatan, flagship of the Pacific squadron. He served on the Saco of the European fleet from 1870 to 1872, returning in the following year to Washington, for duty at the navy yard.

In the latter part of 1873 he was assigned to the Colorado, on the North Atlantic station, and served on that vessel one year. The same year he was made chief engineer. From 1875 to 1876 he served on the North Atlantic station, on the Ossipee. He was on the Essex in 1877, and the next year was assigned to the South Atlantic station, serving here until 1881. The latter year he was placed on duty with the receiving ship Franklin. The next year he was ordered to the Asiatic station and assigned to the Juniata. In 1886 he returned to the United States and was placed in charge of the stores at the Norfolk navy yard, on which duty he remained until 1889. He was assigned to the Pacific station in the latter year, and served in various capacities at different stations until his retirement, Feb. 17, 1900, with the rank of rear admiral.

CONFERENCE WITH CANADIAN OFFICIALS.

Ottawa, Ont., Feb. 13.—Capt. Geo. P. McKay of the Lake Carriers' Association has been here for two or three days in consultation with officials of the marine department. He is supporting the efforts of Canadian vessel owners to secure aids to navigation that are very much needed on the lakes and is working in harmony with T. Donnelly, chief inspector for the Canadian Lake Underwriters' Association, Mr. John Gaskin of the Canadian Vessel Owners' Association, and Mr. W. J. White, solicitor of Toronto, who is thoroughly acquainted with the needs of shipping in Canada. These gentlemen have been very cordially received by officers of the government.

It has been decided to establish, just as speedily as possible, a first-class life saving station on Point au Pelee, Lake Erie, with up-to-date appliances and a paid crew. The efficient lighting of South-east shoal and Pelee middle ground, Lake Erie, is of course one of the objects of Capt. McKay's visit. The attention of the department has also been directed to the fact that the existing light on Middle island, Lake Erie, has been obscured and its usefulness destroyed by trees that have grown up between the channel and the light.

On the subject of difference between rules of the road for vessels of the United States and those of Canada navigating the lakes, a lengthy document was submitted to the department. It was explained that the conflict in signals, etc., is very liable to cause confusion and accidents. Modifications suggested in the Canadian rules so as to have them conform with the White law, under which vessels of the United States are operated, are fully set forth in the document.

The department of public works is asked to establish some means of communication—telephone or telegraph—between Long point lighthouse and Port Rowan, Lake Erie. Vessels in shelter at Long point can not now communicate with the mainland, and it often happens, too, that vessels in distress in this vicinity could more readily secure assistance if they had means of ready communication.

DULUTH GRAIN SITUATION.

The Duluth correspondent of one of the Cleveland vessel owners says: "The Canada-Atlantic Transit Co. is said to have contracted to move half a million bushels of wheat at the opening of navigation from Duluth to Montreal at 5¼ cents. One small Canadian steamer has been chartered at 2 cents for wheat, Duluth to Georgian bay, opening shipment. These are the only engagements, there being as yet no sincere inquiry for Buffalo tonnage. There is plenty of ice outside the harbor, but the steamer Bon Ami passed through the field Saturday. The weather is seasonable. Following is a comparative exhibit of the grain in store:

	1900.	1901.
Wheat	8,089,482	7,216,001
Barley	157,184	74,617
Flax	315,408	365,334
Oats	182,372	957,003
Rye	380,764	294,219
Corn	567,069	2,693,345
Total	9,692,279	11,600,519

It was formally announced Wednesday that the navy department had decided to award to the Bath Iron Works and to the Newport News Ship Building & Dry Dock Co. the contract for building each a protected cruiser, providing they will do so upon the same terms and conditions as were included in the award already made to Neafie & Levy of Philadelphia for a similar ship.

MORE BIG PROJECTS AT THE SAULT.

(Special Correspondence to the Marine Review.)

Sault Ste. Marie, Ont., Feb. 13.—As soon as spring opens the task of erecting "remedial works" at the head of the great rapids of Sault Ste. Marie, at the eastern end of Lake Superior, will commence. It is announced by Mr. F. H. Clergue, who has this week returned from London, that the Michigan-Lake Superior Power Co. will build these works, in accordance with the direction of the government and on plans approved by the United States engineers. These works will consist of a series of concrete dams, 50 ft. apart across the river, connected by movable steel shutters that can be handled to maintain the level of Lake Superior whatever may be the volume of water drawn off through the company's canals. The dams will cross the river close to the line of the international railway bridge. The Michigan canal approaches completion, and the third canal, to be on the Ontario side nearly half a mile north of the original waterway, is also well started. It is Mr. Clergue's hope and intention that in a few years no water will pass out of Lake Superior without doing its work, either for the furtherance of navigation or for the generation of power.

The company today makes announcement of an important addition to its projected metallurgical works, in the shape of two 300-ton charcoal iron blast furnaces, which will be "very much the largest ever built or planned." These two furnaces will be located near the new metallurgical works, which are now under construction about a mile northwest of the rapids at a point along the shore. The charcoal iron industry has not advanced in company with that of coke iron, and the charcoal furnace of today stands about where it did when the coke furnace was of 150 tons daily capacity. One reason for this has been the cost of fuel and the scarcity of wood suitable for making charcoal, large furnaces requiring such an enormous quantity of forest annually as to make their lengthy location at any one point impossible. Another reason has been the supposedly fragile character of the fuel. Mr. Clergue has been making experiments along the lines covered by the latter objection, and of various processes for saving the by-products, and has decided that the limit of size has by no means been reached, and his two new furnaces are to prove this. His company has such an enormous grant of forest lands, both pine and hardwoods, that he will have material for charcoal for an unlimited period, as well as for his two large pulp mills and other factories. There are thousands of square miles of hard wood forest along the Algoma Central Railway now pushing its way toward Hudson bay. New systems of ovens will save all valuable by-products from carbonization.

In erecting these furnaces the Lake Superior company will furnish its own pig iron for the Bessemer and open hearth steel plants now under way at the Sault and for the large foundries now in operation at the same point. It will be possible therefore to absorb the profits of the several steps in the manufacturing processes as well as to reap the benefit of the large Canadian bonus. It will also serve to make a market for the ore of the Helen mine at Michipicoten without forcing it into the United States against the 40-cent duty. With this latter thought in mind the company has become interested in the Canada Iron Furnace Co. at Midland and in the Cramp Ontario Steel Co. that proposes to erect works at Collingwood, and the combined consumption of Helen ores by these various works will be sufficient to keep a very large mine quite busy.

Mr. Clergue states that 200 carloads of material for the Bessemer plant at the Sault are now on the ground; that the contract for the steel erections have been let to the Riter-Conley Co. of Pittsburg; that the stone buildings, which will be conformable architecturally with the other structures of the works, are already well along, and that the erection of machinery has commenced. It is proposed to have the Bessemer plant in operation by midsummer if possible.

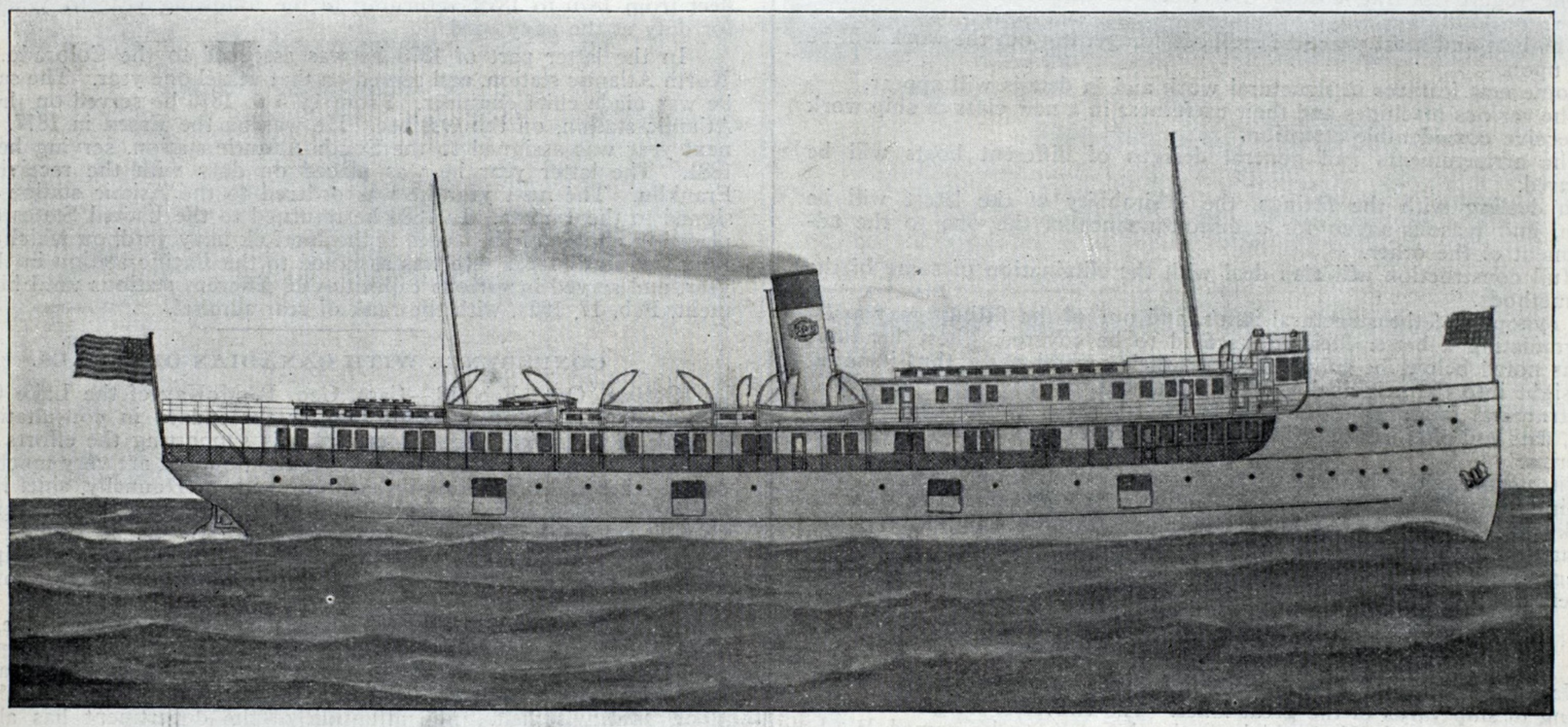
The Midland furnace, which has been running on Michipicoten ore since its opening, is making about 125 tons daily of excellent iron. Until the new furnaces at the Sault are ready, the iron for the Sault Bessemer plant will come from this furnace, which is now storing for the purpose.

Four steel ships to be added to the Algoma Central Steamship line are now under way in English yards and will come over in the spring with the four that were brought over a year ago. All with be utilized in the transportation of Helen ore to furnaces.

In order to carry out its immigration contract with the government, one of the arrangements under which it secures the 2,400,000 acres of land north of the Sault and a cash subsidy of $480,000, Mr. Clergue has opened immigration offices in London and Liverpool. He will not endeavor to bring many Englishmen to the lands secured from the government, but will push his propaganda among farmers, miners, laborers and skilled workers of northern Europe, preferably Sweden and Norway. Many of these will be employed in the various works planned or under construction by the company. Several thousand of these men will come this year, though the government contracts calls for but 1,000 per year for a period of ten years.

HOLLAND & CHICAGO TRANS. CO.'S NEW VESSEL.

The steel screw passenger steamer now building at the yards of the Craig Ship Building Co., Toledo, O., for the Holland & Chicago Transportation Co., and which is illustrated in this issue, is promised for May 1. Her dimensions are 240 ft. over all, 40 ft. beam, 16 ft. to the lower hold, and 8 ft. between decks. She will be equipped with a full cabin of staterooms on the upper deck and will have the pilot house, officers' room and social hall on the hurricane deck. Her cabins will be finished in hard wood, and it is designed to make her the equal of anything afloat on the great lakes in her line. She will ply between Holland and the ports on the east shore of Lake Michigan in the freight and passenger business.



The Holland & Chicago Transportation Co.'s New Vessel.

Building at the Craig Ship Building Co., Toledo, Ohio.

Her engines are to be triple expansion with cylinders of 21, 35 and 38 in. diameter, and 40 in. stroke. Steam will be supplied by four Roberts water tube boilers. She will have a speed of about 18 miles an hour upon an I.H.P. of 1,500. The steamer, complete, will cost $180,000.

THE YEAR'S SHIP BUILDING IN BALTIMORE.

The year in Baltimore, from a ship building standpoint, has never been surpassed in the value of the output. The tonnage production for 1900 was exceeded but twice in the last two decades, namely, in 1892 and 1899, but the value has never been exceeded. Forty-four vessels of various types were built in the ship yards of Baltimore during 1900. The tonnage of these vessels was 15,329, against 18,329 in 1899. Notwithstanding the decrease of 3,035 tons the value of the work for 1900 was $1,645,570 against $1,633,300 in 1899, an increase of $12,270. The Maryland Steel Co. at Sparrow's Point, near Baltimore, turned out 9,043 tons of steel vessels, valued at $1,120,000, which was the bulk of the output. The year's production is classed as follows: One steamship, one torpedo boat, four dredging vessels, five tugs, two yachts, twenty-seven freight lighters, two steam hoisters, one fishing steamer and one car float.

NAUTICAL ENCYCLOPEDIA IN PREPARATION.

The Marine Review Publishing Co., Cleveland, has in course of preparation and will shortly issue from its press a book entitled "Patterson's Illustrated Nautical Encyclopedia." The information in the encyclopedia has been prepared by Capt. Howard Patterson after years of research. It will be the only book of its kind in print. It will deal with 6,000 nautical subjects and will contain 600 engravings, many of them of full-page size. It will, in addition, be illuminated with the flags of all nations in colors and will be handsomely and durably bound for use on shipboard. The price of the encyclopedia will be $3 per copy. Orders may be sent in now.

Capt. Howard Patterson, a former naval officer and author of several works on nautical science, is well known as the president of the New York Nautical College. His work on this encyclopedia has extended over ten years or more and it will undoubtedly meet with general favor.

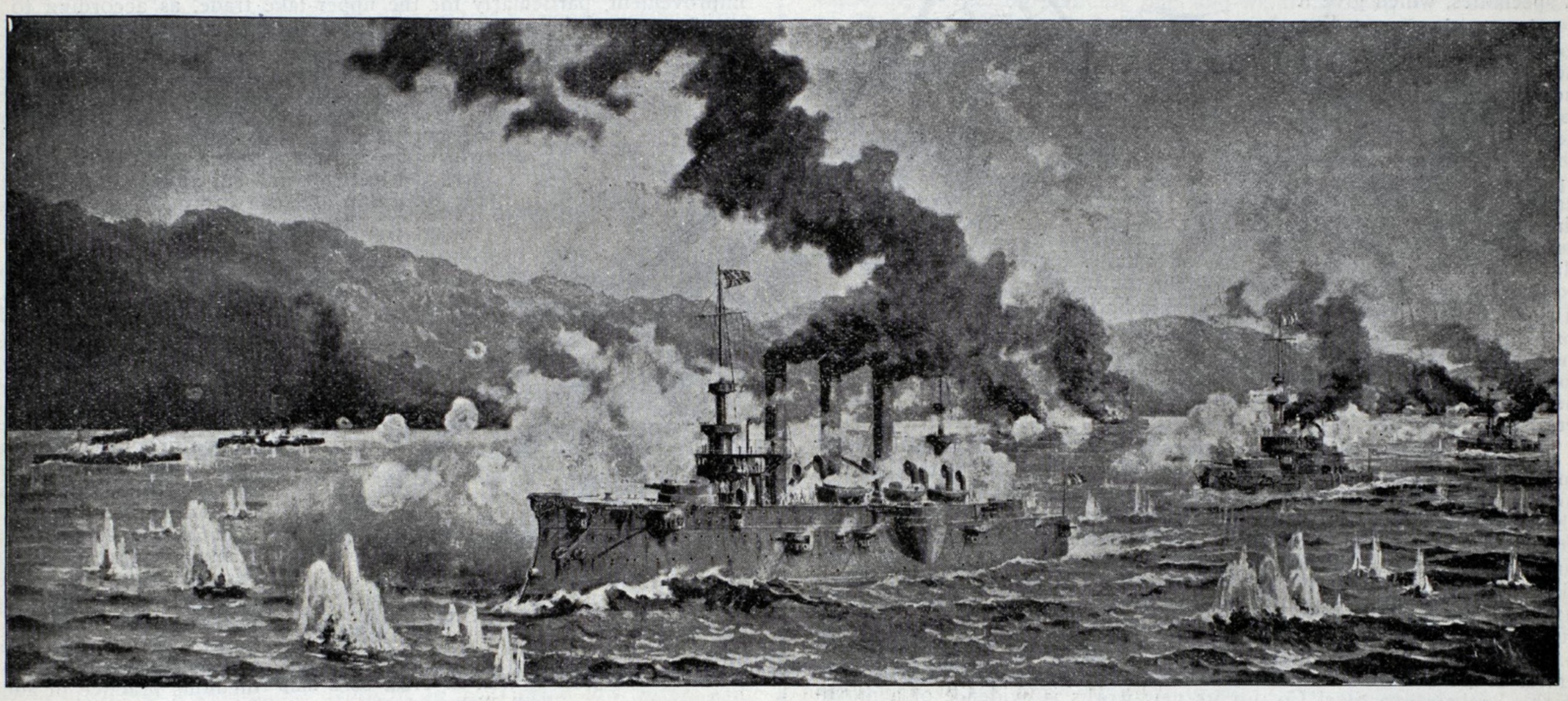
Vessel interests of the late Commodore Wm. H. Wolf of Milwaukee will be managed by David Vance & Co. of that place.

DESCRIPTION OF THE BATTLE OF SANTIAGO DE CUBA.

Probably no officer of the United States navy has taken a more lively interest in the welfare of this branch of the governmental service than the present chief constructor of the navy, Rear Admiral Philip Hichborn. Notwithstanding his multitudinous duties as chief of the bureau, which has in charge the construction and repair of all vessels of the navy, he has found time within the last few years to investigate the history of early naval architecture in America, and as a result has placed in the office of the chief constructor a series of seven paintings illustrating 400 years of progress in this science or from the caravels of Columbus in 1492 to the Pennsylvania class of battleships of 1901.

In addition to this series, and as a climax to the story of naval progress, a large painting of the latest engagement, which reflected credit on United States naval construction, has been added, namely, the battle of Santiago de Cuba. Almost all the vessels engaged in this action were from designs of which Mr. Hichborn has had supervision, and while a certain pride exists for this fact, the greater delight of perpetuating the heroism of the officers and men and the glory achieved by the United States navy, has actuated the preparation and hanging of this canvas.

It will be remembered that between 9:35 and 10 o'clock on the morning of Sunday, July 3, 1898, when the Spanish vessels attempted to escape from Santiago de Cuba, the United States blockading fleet consisted of the Brooklyn, Texas, Oregon, Iowa, Indiana and the auxiliaries Gloucester and Vixen, arranged in a semi-circle about the harbor entrance, about 2½ to 4 miles from shore, that being the limit of the day blockading distance. Two other vessels of the fleet were unavoidably absent, the



Viscaya. Colon. Brooklyn. Oquendo. Maria Teresa. Oregon. Furor. Texas. Iowa. Pluton. Indiana. Gloucester.

The Battle of Santiago.

Massachusetts and the New York, the former having left at 4 o'clock a. m. for Guantanamo to coal, and the latter to convey Rear Admiral Sampson to Sibony for a conference with Gen. Shafter. When the Spanish fleet cleared the harbor's entrance, it became at once apparent that a running fight was planned instead of an attack upon the American fleet. This method of escape attempted by the Spanish fleet, all steering in the same direction and in single formation, made the scheme of battle very easy for the American squadron. The first rush of the Spaniards to the westward carried them past a number of the vessels of the blockading squadron, whose crews were at Sunday "quarters for inspection," but when the warning "Enemy's ships escaping" was reported from the lookout and "general quarters" sounded, the men dropped clean clothes and polished accoutrements and with a cheer sprang to man the guns. The thorough training they had received in the service quickly demonstrated to the enemy that they had encountered no ordinary opponent, for in less than three-quarters of an hour from the time the last Spanish vessel had left the harbor, four of the six vessels comprising the fleet had been reduced to burning shapeless masses of steel by the terrible accuracy of the American gunners.

The Spanish plan of escape resulted in an engagement extending over a distance of 50 miles, the vessels of both fleets in the meantime changing their relative positions. The time selected for the painting was about 10:20 o'clock a. m., in position 4, as shown on "chart showing positions of ships of Admiral Cevera's squadron and those of the United States fleet in the battle of July 3, 1898, off Santiago de Cuba," published by the bureau of navigation. This position is off Cabrera point, looking eastward. The Spanish ships are seen close in shore, the Viscaya leading and the Colon following, the Maria Teresa and Oquendo on fire turning to run in shore, and the torpedo boats Furor and Pluton practically destroyed. The American fleet is shown in the foreground with the Brooklyn in the lead, followed by the Oregon and Texas, while in the distance are seen the Iowa, Indiana and the auxiliary yacht Gloucester. The engagement at this time and in this position was probably the most exciting and picturesque of any during the battle, and its portrayal by the artist is very realistic and inspiring.

This painting, probably, is as truthful a representation of the battle of Santiago de Cuba as if the artist had painted it from actual sight, because of the advice and experience of officers engaged in this action having been sought and given, and no doubt will remain in the office of the chief constructor of the navy as a memorial to the officers and crew who manned, and the ability of the architect who designed the vessels which in two hours' time sank the entire fleet of the enemy with but the loss of a single man to the United States navy.

A NEW YORK SKETCH OF A. B. WOLVIN.

The New York Commercial contains the following sketch of A. B. Wolvin, president of the Lake Carriers' Association:

"Augustus B. Wolvin was not a candidate for the presidency of the Lake Carriers' Association, but he was unanimously elected to that position at the recent meeting in Detroit. It has been a characteristic of Wolvin ever since he was old enough to be noticed that, when anything worth having came along, he was not far off—and that, too, without any effort on his part, it generally fell into his hands. Wolvin is one of the best known westerners who flit around the uptown New York hotels at night. He is a warm friend and associate of John W. Gates, and when in town he may generally be found at the Holland, the Waldorf-Astoria and other hotels frequented by the steel men of this city and Chicago. He was here awhile last week arranging some details of the business of the newest steel ship enterprise in which he is engaged—that with Frank H. Peavey, the most notable western grain receiver, whose home is in Minneapolis. He is yet a young man, energetic and of excellent judgment, and what he doesn't know of lake shipping is not worth the knowing. He is one of the directors of the American Ship Building Co., president of the Superior Ship Building Co., which is the old McDougall plant of Duluth, and a manager of the Great Lakes Towing Co., the tug combine of the lakes. He was the moving spirit in the construction of the Zenith Transit Co.'s ships which, when they came out, were the biggest, finest and most modern vessels on the great lakes, and are today as noted money makers as any. His was the inception of the American Steamship Co., whose other directors were members of the American Steel & Wire Co., to which organization the ships have lately been sold for a premium of $75 a share and just after a dividend of 33 per cent. He had a few hours' conversation with F. H. Peavey the other day, and now they are building $1,500,000 worth of steel ships of the newest class. He was the first to plan ships for combined lake and ocean service, and eight such ships in which he is interested are now either launched or under way. Wolvin never built a ship in which he didn't try some new thing. The Zenith boats were the first freighters in the world to use quadruple expansion engines and water tube boilers, also the first to use mechanical automatic stokers, and each, as it came out, was the largest on the lakes. The ships of the American company followed, and they were still bigger—as big, indeed, as the builders on the lakes were willing to guarantee. The new Peavey ships will have some "wrinkles" for package freight not yet found in any vessel afloat.

"Wolvin was cabin boy on the Dean Richmond, an old-timer that all Hudson river and lake men will remember, way back in 1870. His father was her captain. Then he was mate of the City of Rome, the leader of her day, and captain of the Anne Smith; but since 1889 he has been living in Duluth managing and building ships. J. J. Hill carried Wolvin off to the Pacific coast two years ago, when he was first considering the Pacific system that is now coming to a head in the ships under way at New London, Conn., and he pumped information out of him all the way from Duluth to Seattle and back. Now Hill is building the two greatest freight ships in the world at New London, and Wolvin is associated in the enterprise. He was here the other day on business connected with this scheme.

"The Lake Carriers' Association is an organization of nearly all vessel owners and agents on the great lakes. Two hundred million dollars' worth of shipping looks to the association for guidance in matters of wages, contracts with 'longshoremen, lights, harbors and other aids to navigation, and relies on it to see that nothing happens to jeopardize the interests of the lakes. It keeps a watchful eye on all bridge projects, on the appropriations under the river and harbor bill, on the vast commerce at the Sault and the proper regulations concerning it, and on the government light-house board."

ON THE SOUTH SHORE OF LAKE ERIE.

STEEL INDUSTRY WILL BE CENTERED IN THE FUTURE, SAYS ANDREW CARNEGIE —IN THE DISTRICT KNOWN AS THE CENTRAL WEST MOST OF THE STEEL IS ALREADY MADE.

"The present center of steel," says Andrew Carnegie in the New York Evening Post, "is in the square made by a line drawn from Pittsburg to Wheeling, northward to Lorain, eastward to Cleveland, and south again to Pittsburg. In this territory most of the steel is made. Allegheny county alone (Pittsburg) in 1899 produced nearly one-quarter of all the pig iron in the United States, almost half of the open-hearth steel, and almost 39 per cent. of the total production of all kinds of steel. As far as the writer sees there is little chance of this region being soon displaced. Colorado will, no doubt, expand as the western coast is developed. Chicago's position as a steel manufacturer is assured. There is no sign of the great southwest making steel to any extent. As late as the middle of the last century the eastern states upon the Atlantic constituted the home of steel manufacture. Even in Pennsylvania the half of all the steel was made east of the Allegheny mountains. Since then the trend has been constant and rapid to the region known as the central west, which has Pittsburg as its metropolis. The transfer of the great Lackawanna Iron & Steel Works of Scranton, Pa., to Buffalo, and the splendid triumphs of the Bethlehem Steel Co. (Pennsylvania) in armor, guns, and forgings as specialties, which give it a unique and commanding position, are proofs that for the making of ordinary steel the location is not favorable. The history of the steel works at Troy is another case in point. There is one exception to this march westward at Harrisburg, in eastern Pennsylvania, which remains a prosperous and important center of manufacture. The Maryland Steel Co. at tidewater has advantages for export, but probably more important for the future of that company is its development in ship building, for which it is peculiarly well adapted. So far as the writer sees there is nothing to change the national center of steel manufacture in the new century; it is in the central west already described, and there it is likely to remain.

"In that center itself there are causes at work which may lead to some important changes. The wonderful growth of the lake cities on the northern border of the central west region is shown by the recent census. These possess the advantages of the extremely low cost of lake transportation and by the Welland canal, by which vessels of considerable tonnage can load at Conneaut and other lake ports direct for Europe, and above all the low rates which the Erie canal insures manufacturers for more than half the year. These are attracting attention, especially since an effort is being made to weld the trunk railway lines into one directorate to enable them to exact higher rates of freight when lower prices for service or articles seem to be the prevailing law. The selection of Buffalo by the Lackawanna Steel Co. for its new works is evidence of a movement to the lakes. The policy of the railroad combination will inevitably operate in favor of the southern ports and to the disadvantage of New York. The differential rate of 3 cents per hundred in favor of Baltimore and 2 cents in favor of Philadelphia over New York certainly means that the traffic will continue to seek these ports, and that New York's percentage of the shipping trade will steadily fall, as it has been doing. It is not to be supposed that the city and state of New York will fail to protect their position by improving the weapon which New York state alone of all states has in her waterway from the lakes to the port of New York. The writer takes this for granted, and consequently predicts a great development in steel manufacture in that part of the central west lying along the southern border of Lake Erie, which will inure to the benefit of New York as being the port which may be reached cheapest from the central west by water.

"One of the features of the coming century is to be a return to water transport for heavy materials. Lake ships of 7,000 tons burden already exist. Barges will ply upon the Ohio river, soon to be slackwatered, and upon the enlarged Erie canal, and also that from Chicago to the Mississippi; and many other waterways will be opened upon which the raw materials for steel and the finished article itself are to be carried by manufacturers at rates already reached upon the lakes, one-third and often one-fourth those charged by rail.

"The influence of our steel-making capacity upon development at home must be marvelous, for the nation which makes the cheapest steel has the other nations at its feet as far as manufacturing is concerned in most of its branches. The cheapest steel means the cheapest ships, the cheapest machinery, the cheapest thousand and one articles of which steel is the base. We are on the eve of a development of the manufacturing powers of the republic such as the world has never seen, and the writer who is honored by being asked to write for the Evening Post its record of the twentieth century may present figures as surprising as I have to submit for the nineteenth. The republic's progress and commanding position as a steel-producer are told in a few words: In 1873, only twenty-seven years ago, the United States produced 198,796 tons of steel; Great Britain, her chief competitor, 653,500 tons—more than three times as much. Twenty-six years later, 1899, the republic made more than double as much as the monarchy, the figures being 10,639,857 and 5,000,000 tons respectively, an eight-fold increase for Great Britain and fifty-three-fold for the republic, and almost 40 percent. of all the steel made in the world, which was 27,110,000 tons. Industrial history has nothing to show comparable to this."

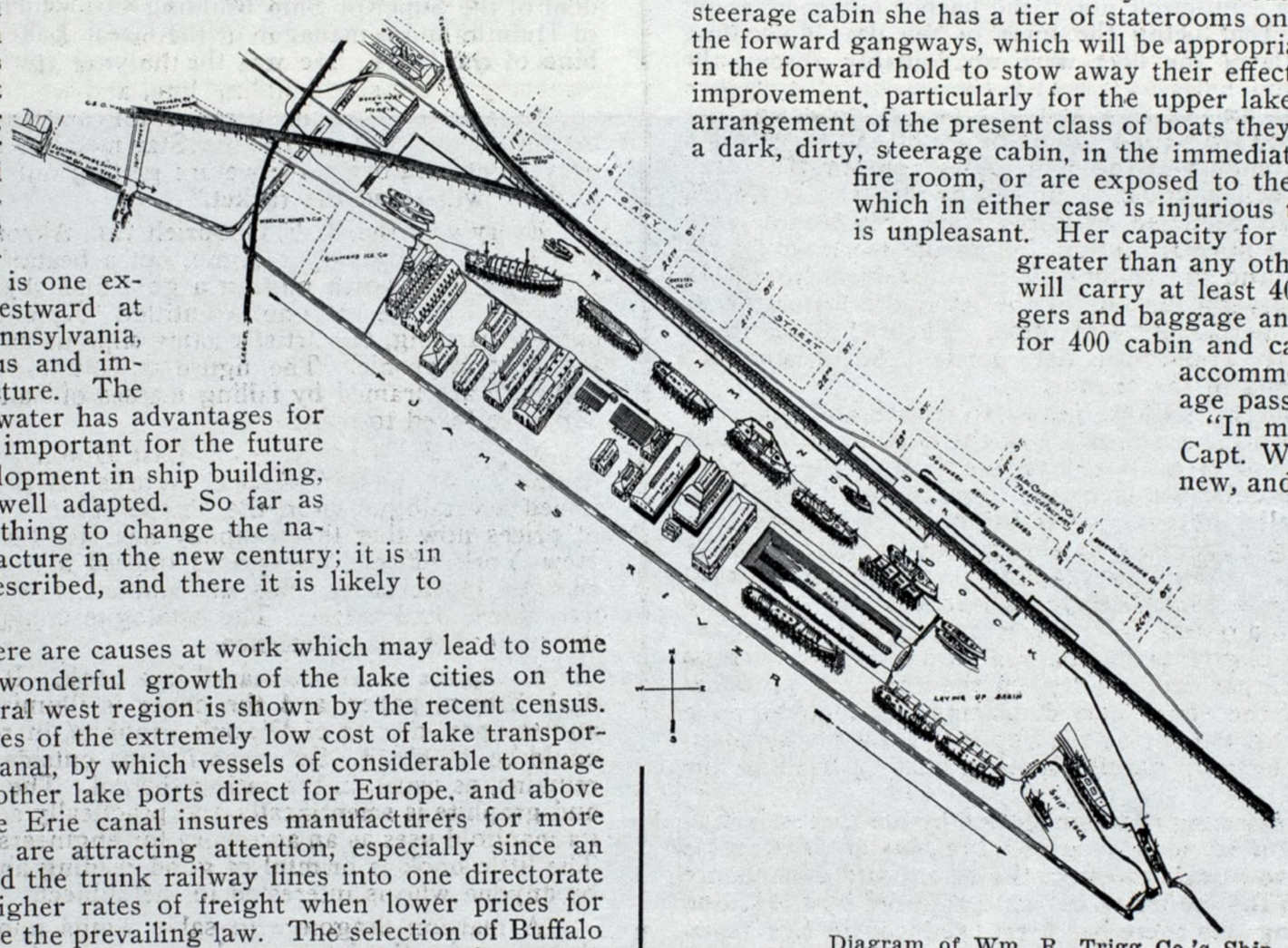


Diagram of Wm. R. Trigg Co.'s Ship Yard, Richmond, Va.

EARLY DAYS ON LAKE ERIE.

Capt. F. A. Ketchum of Ceylon, Erie County, O., has been so good as to send to the Review some data relative to early days of navigation upon Lake Erie. He has in part a record which reaches back to 1837, containing much of value. From files in his possession we take the following description of the steamboat Great Western, which was contributed by an admirer to the Commercial Advertiser of Huron for March, 1839:

"Mr. H. C. Gray, sir: I visited this fine boat a few days since in company with Capt. Walker and was very agreeably surprised with her majestic and imposing appearance. Capt. Walker has built many boats but none to compare with the Great Western. The George Washington was dubbed with the appellation 'floating palace,' which her magnificent arrangement and fixtures richly merited, but in traversing the different apartments of the Great Western you would imagine yourself in a splendid hotel with every requisite feature and convenience from the kitchen to the drawing room. The new arrangement of having the gentlemen's cabin on the promenade deck, something after the plan of the Mississippi boats, is certainly an improvement—being much more pleasant and giving more space for the necessary accommodations. Forward of this is the gentlemen's saloon and abaft the drawing room, with state rooms fore-and-aft, the gentlemen's cabin on both sides. The ladies' cabin is on the main deck with the ladies' saloon abaft it and a continuous tier of state rooms on both sides of the ladies' cabin. The accommodations for steerage passengers are different from any other boat on the lakes. Instead of a steerage cabin she has a tier of staterooms on both sides from the after to the forward gangways, which will be appropriated to their use with a place in the forward hold to stow away their effects. This is certainly a great improvement, particularly for the upper lake trade, as according to the arrangement of the present class of boats they are crammed en masse into a dark, dirty, steerage cabin, in the immediate vicinity of the boilers and fire room, or are exposed to the weather in the main deck, which in either case is injurious to health, or to say the least is unpleasant. Her capacity for carrying freight is probably greater than any other boat at present out. She will carry at least 400 tons exclusive of passengers and baggage and has ample accommodation for 400 cabin and can carry and give the usual accommodations to about 600 steerage passengers.

"In modeling the hull of this boat Capt. Walker has got up something new, and if it should succeed (and so far as my knowledge goes I have not the least doubt of it), he will have commenced a new era in the modeling of steamboats. In the first place she has a larger proportion of beam than usual, and at the same time, owing to the peculiar turn of her bilge, what is termed in marine parlance very easy water lines. Therefore possessing in many particulars the qualities of both a wide and narrow boat without resorting to the ridiculous practice of adding false sides, so-called after the hull is once completed. She has what is called a medium stern, that is between a round and square stern, combining the strength of the former, by planking quite round, with the convenience of the latter in having a broad transom and cabin windows. Her bow, I think, will be pronounced by connoisseurs in this matter a 'masterpiece,' combining great strength with beauty and symmetry. She is ship rigged and has a bust of the Great Western discoverer for a figure head. She is 181 ft. in length, 34 ft. 4 in. beam (60 ft. including guards), and 13 ft. hold. She measures 781 tons and is to be propelled by one of Messrs. Warden & Benney's best high-pressure engines, which are never known to miss fire. The master shipwright, B. Goodsell, who is favorably known about the lakes, has, in constructing this boat, shown himself master of his trade in every respect. The joiner work was executed under the supervision of Mr. John Dickson, who has done himself great credit in the neat and workmanlike manner in which the cabins are finished.

"I would now ask leave to say a few words respecting the man who has got up this splendid boat and close my remarks. Capt. Augustus Walker may be classed among that portion of our fellow citizens who are styled self-made men. He first commenced his sailing as a cabin boy on board of a small schooner and by dint of industry and perseverance has kept advancing until now he wields the scepter of authority over three splendid steamers, exclusive of a snug landed estate. The Great Western makes the fifth steamer he has superintended the building of, and all have proved themselves boats of the first class and all have been successful with one exception, the George Washington, and in fact this should not be classed among the ordinary shipwrecks, for it would appear that the Great Ruler of the waves has decreed that no craft bearing the name of him who was 'first in war, first in peace and first in the hearts of his countrymen' should ever buffet the waves of our great lakes successfully, there having been two splendid steamers and two schooners bearing that name at different times and all have shared the same fate."

The following is from the Commercial Advertiser of Huron for Jan. 31, 1837: "Perhaps it would not be amiss for us to notice the number of steamboats on the lakes that Huron has furnished since her existence as a town. The Sheldon Thompson, now lying at our wharf, was, we believe, the first steamboat ever launched at this port. She was built in 1828 by Capt. F. Chester, under the superintendence of our fellow townsman Capt. A. Walker. The boat has under the guidance of a number of commanders successfully navigated the lakes ever since and is now undergoing thorough repairs, which will enable her to resume her station among boats of the first class on the lakes at the opening of navigation in the spring. The next boat built at this place was the magnificent vessel

George Washington, denominated by many and by the press during its existence a floating palace. She was, indeed, a splendid craft, being of about 700 tons and was finished and furnished in a style superior perhaps to any other boat on the western lakes. She was also built under the supervision of Mr. Walker, to whom no small degree of credit should be attached for the undertaking, but unfortunately she was wrecked the first year of her existence on Long Point, Canada shore. The third boat built was the steamboat Delaware, which was launched in 1833 and was wrecked on Lake Michigan during the summer of 1836. The fourth vessel launched was the steamboat United States, which was begun in 1832 under Capt. Walker and finished under Capt. N. E. Hart. The fifth was the steamboat Columbus, built in 1835 by Capt. Walker, and there followed the steamboats Dewitt Clinton, Erie and Cleveland, all built by Capt. Church."

THE REACTION BREAKWATER.

In a recent issue of the Journal of the Franklin Institute the applicability of the so-called reaction breakwater to the South Pass of the mouth of the Mississippi, which has been ably advocated by Prof. Lewis M. Haupt of Philadelphia, is discussed and some interesting points brought out. The reaction breakwater is really a device to utilize the well-known tendency of a channel to hug the concave bank of a bend, the action of the curvature being to produce a scour due to the concentration of the currents. The matter is also the subject of correspondence in recent issues of the Engineering News, in which the advantages of the single reaction jetty over the proposed pair of straight jetties of the government board are emphasized.

Prof. Haupt's plan, which has been elaborated with care for the particular case under consideration, involves the construction of a jetty starting from East Point and extending nearly two miles in almost a straight line parallel with the axis of flow and at a proper distance from it, thence curving to the westward with a radius of about 4.64 miles for a little more than 2 miles and ending at the 30-ft. outer contour. The portion of the area of discharge which would be cut out by this jetty is 115,750 sq. ft., or 66 per cent., which deducted from the total area would leave 59,375 sq. ft., or less than the normal section, but as the work would require several years to build and the volume of the movement would be confined to the overflow following the line of the jetty, the formation of the channel would be local, permanent and rapid. The 15,000 sq. ft. of water section on the west flats would ultimately partially fill up and thus assist in confining the currents to the channel.

The inability of two straight, parallel jetties to create and maintain a deep channel is obvious upon the examination of the conditions, and this is practically admitted when it is proposed to supplement their action by dredging some 22,000,000 cubic yards of silt from the bar. The ultimate action of straight parallel jetties is to transfer the conditions to a point further out, recreating conditions at the mouth similar to those occurring in a state of nature. The jetties, acting as an aqueduct, must transport all the river sediment through the canalized channel and dump it into the sea at its mouth, and unless there is a strong littoral current the external forces are unable to distribute the material and dredging must be constantly employed. The single curved jetty, on the contrary, produces a reaction and scour across the entire bar, displacing the material in a lateral direction and depositing the silt on the opposite bank of the channel, where it automatically forms a natural levee, adjusting itself to the regimen of the stream.

The correctness of this reasoning is demonstrated by the success which has attended the construction of such a curved breakwater as Aransas Pass, Texas. Here there is no stream to effect the scour, and dependence must be placed entirely upon the moderate current produced by the action of the tides. Notwithstanding this there has been produced in five years, without dredging, a continuous depth of 15 ft. at mean low water, with maximum depths of 25 ft. The formation of a natural spit on the convex side of the breakwater effectually disposes of all question as to the permanency and stability of the structure, and although only partially completed, this example is a most conclusive demonstration of the correctness of the principle.

MEDALS FOR THE NAVY.

The naval board appointed to consider the best method of recognizing the meritorious services of certain officers and men who participated in the recent naval operations, has submitted its report to the secretary of the navy. The board recommends a system of medals as rewards for distinguished and meritorious service. Four such medals are suggested, to be known respectively as the medal of the Republic, the Paul Jones medal, the Farragut medal and the Campaign medal.

The medal of the Republic is designed for cases of the highest merit. It will be awarded only to the commander-in-chief of a fleet or squadron, who gains a decisive victory over a fleet or squadron of the enemy equal or superior in strength. It is said at the department that Admiral Dewey and Rear Admiral Sampson are the only officers eligible for such a medal by reason of services in the war with Spain. This medal carries with it an increase of pay of 33 1-3 per cent., and upon the death of the recipient his widow will draw a pension equal to his active pay until his children reach the age of twenty-one years. The Paul Jones medal can be awarded only to an officer contributing in special manner to a decisive victory over an enemy. Twenty-five per cent. increase of pay will accompany this medal. The Farragut medal can be awarded only to an officer or enlisted man distinguished by eminent conduct in action, such as rescuing a wounded man under fire, etc. A small pension will be given with this medal. The Campaign medal will be awarded to officers and men participating in a campaign.

It is reported from London that the Cramps and Vickers-Maxim ship and gun combine will be consummated within a fortnight. Directors of the new company will include Charles H. Cramp, Samuel Cramp and C. A. Griscom, representing the American interest, and Albert Vickers and Siegmund Loewe on behalf of the British end of the concern. It is said that delay in the negotiations has been caused by the uncertainty of the Midvale Steel Co. joining the deal and making it a triple alliance of ship, armor and armament builders. According to plans now outlined it is proposed to spend $1,250,000 in adding a gun plant to the Midvale works. No portion of the Vickers-Maxim English properties will be transferred, only their American patents passing to the new company.

TRADE NOTES.

Mr. A. E. Borie has been appointed general sales agent of Bethlehem Steel Co., with headquarters at South Bethlehem, Pa., the appointment dating from Feb. 1, 1901.

The Bullock Electric Manufacturing Co. recently opened an office at 675 Ellicott Square, Buffalo. The office will be under the management of Francis B. Smith, an electrical engineer of experience.

A second edition of the lecture by Walter B. Snow on "Mechanical Ventilation and Heating by a Forced Circulation of Warm Air" has just been issued by the B. F. Sturtevant Co., Boston, Mass., by whom it will be mailed on application.

A very extensive catalogue has been issued by the Skaneateles Boat & Canoe Co., Skaneateles, N. Y., in which is set forth the advantages of their yachts, catboats and tenders. All work is done under their own supervision, and is guaranteed.

Offices of the Electro-Dynamic Co., Philadelphia, have been removed to 212-226 Ionic street, a more convenient location, and the company's factory has been enlarged. With additional space and new equipment they are better than ever prepared to promptly fill orders in their lines of electrical apparatus especially designed for marine work.

Maj. J. H. Willard, United States engineer at Chicago, has advertised for proposals for dredging the Chicago harbor, bids to be opened March 12. The funds available for the work are about $90,000. The work consists of redredging the Chicago river from Rush street to the north end of the easterly breakwater, a distance of about 1,300 yards.

One of the officers of the Boston & Lockport Block Co., Boston, Mass., says: "Our business for the year has started off very auspiciously, especially in the ship building line, and we are looking for a continuance of this activity. In the demand for hoisting blocks that are used for machinery and that require our Star metaline bushing there is decided improvement, and of course we are getting our share of the business as this bushing will stand the racket."

Every year the B. F. Goodrich Co., Akron, O., issues a picture to the trade—not an ordinary chromo, but a beautiful specimen of the printer's art, something worth putting a gold mat about and hanging up in one's library. The present one is entitled "Kate." It is a reproduction of a famous painting, the artist's name slips us at this moment, and is a head and bust in profile. The figure is voluptuous, the face exceeding fine, and both are framed by falling masses of hair of that peculiar hue which Titian so loved to paint.

Mr. C. P. Goertz, No. 52 East Union Square, New York, manager of the C. P. Goertz Optical Works, Berlin-Friedenau, Germany, has issued a catalogue upon the Trieder binoculars, setting forth a new list of prices now that the company has facilities for mounting them at the New York office. The prices quoted are precisely the same as those charged in Germany, plus the amount of duty charged for importation into the United States. The catalogue contains an excellent essay upon the subject of optical science.

"Graphite as a Lubricant" is a book. It is a book bound in brown, dark brown, paper, and the cover is illuminated with drawings of five and ten-pound cans of Dixon's graphite, in red. Nothing more effective could be imagined. So much for the outside. The proof of the pudding remains, as usual, in the eating thereof. The inside is excellently printed, and graphite is scientifically and practically considered as a lubricant, and its manifold uses as an accessory for engineers and mechanics is discussed. The little book is brimful of good reading and can be had for the asking by anyone who is interested in the subject.

A maroon dragon with sable wings upon a maroon background is the cover for the latest catalogue of the American Blower Co., Detroit, Mich., which is devoted to a consideration of the advantages of mechanical draft. Mechanical draft has indeed been employed for years. Its advantages as a powerful agency to increase the efficiency and steaming capacity of boilers have been proved so often as to leave no room for doubt. The book discusses forced and induced draft with fans and blowers. Every one who wants to be informed upon the subject—and, of course, mechanical draft is especially efficient on shipboard—should write for the book.

New England, of course, is the home of block factories. J. S. Jackson & Son of Bath, Me., announce in one of their pamphlets that they are entering upon their hundreth year of continuous operation as manufacturers of tackle blocks. Great have been the strides in that time from the chunk of maple worked into shape by the bench knife and gouge to the nicely-finished article of today. The pamphlet contains a picture of a ship that was built nearly a century ago by the Bath firm that is now known as A. Sewall & Co. "The outfit of this ship," says the pamphlet from Jackson & Son, "was one of our great contracts of nearly one hundred years ago and many long sixteen hour days were wearily passed before it was completed. This ship was of about 500 tons burden and for the greater part of a year we were busy with her outfit. Today we could give her a full cargo of outfits in the same time.

Walter Coleman & Sons, Providence, R. I., have issued a book. It is bound in paper, contains eighty-two pages, and is devoted to a description of tackle blocks. It is quite an authority on the subject. The book recommends itself by this announcement at the outset: "The utmost vigilance in selecting and manufacturing sound materials into tackle blocks cannot insure them against occasional breakage, but it reduces the chances to a minimum. Long experience enables us to insure the quality of our blocks, so to speak, by carrying a standing offer with those who handle them to repair breakage of any parts. For many years claims of this nature upon us have been so slight as not to be worth reckoning and therefore we make no hesitation in renewing this offer. If any of our customers can suggest a better way to set forth the superior quality of our goods we invite them to do so; we know of none."

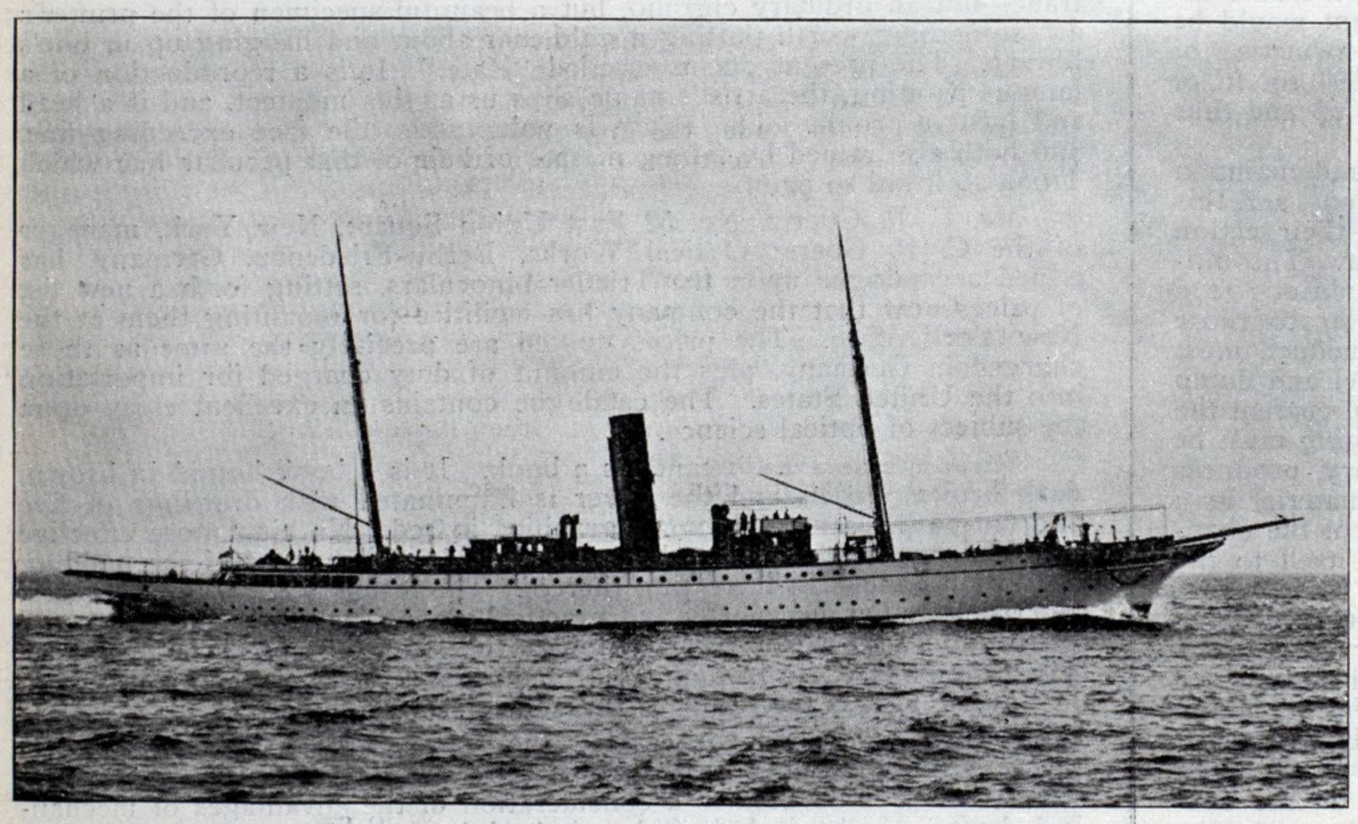
Settlers' rates via the Nickel Plate road—Beginning with Tuesday, Feb. 12, low rate settlers' tickets will be on sale every Tuesday to and including April 30, to Oregon, Montana, Washington and all points in the Northwest. Write, wire, 'phone or call on the nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O. 10 April 30.

WORKS OF MESSRS. A. & J. INGLIS, GLASGOW.

Special Correspondence of the Marine Review.

Glasgow, Scotland, Feb. 1.—As is the case in many long established ship yards, the Pointhouse Ship Yard & Slip Dock, Glasgow, owes its origin to the success attending the first independent efforts of an intelligent, energetic worker, a Mr. Anthony Inglis. In 1837 this Mr. Inglis, having had some few years experience as a journeyman blacksmith, established a small smith shop in Glasgow and sought contracts for smith work from the various steamship builders who were firmly established along the Clyde river at that early date. Such positive success followed his efforts in this line that his brother, a Mr. John Inglis, gave up his occupation as a sea-going engineer and joined him in the development of the smith shop to a marine engine works, and by 1855 they were firmly established as marine engine builders on the property which is still occupied by the engine shops of the firm. In 1862 the extension of the marine engine business and the demand for iron hulls led Messrs. Inglis to the purchase of property on the Kelvin river, just back from its junction with the Clyde, and the establishment of the Pointhouse ship yard. Here they immediately accepted contracts from British owners and the appearance of their products in foreign ports, together with their actual merits, drew contracts from many parts of the world. To execute the calls for repair work a slip dock, or marine railway, was added to the yard in 1867, and its high efficiency can be understood when it is noted that some 2,000 dockings have been made to the present date. Since the addition of the slip dock there have been no particularly noteworthy extensions of the yard, as it has been carried on by the sons and grandsons of the founders with the object of raising the quality and refinement of their construction rather than to increase its quantity.

The Inglis have never taken up British admiralty work, but have confined themselves to the scientific development of the intermediate deep-sea cargo and passenger steamers, high-speed river steamers, steam yachts and other similar special types. Their leading productions in these lines,



Steam Yacht Varuna. Built by A. & J. Inglis, Glasgow.

while perhaps not of international note, are highly interesting and begin with the construction in 1865 of a screw steamer, the Erl King, which was one of the leaders in the England-China service before the opening of the Suez canal. At about this time they also built the first of a series of steamers for the navigation of the Chinese rivers. The design of these boats was taken from the conventional American river steamer fitted with the beam engine. In 1879 Messrs. Inglis made an exceptional record in competitive building by completing and delivering two 2,000-ton vessels in a shorter time than the much larger Fairfield Ship Building & Engineering Co., who contracted for similar vessels for the same French company at the same time. Their development of the cargo passenger steamer is excellently shown by the vessels of the British India Co., for whom they have built and engined nearly 150 hulls. As yacht designers and builders the firm is well represented by a single screw steam yacht of 677 tons and 1,150 I.H.P., the Safa-el-Bahr, which was built for the Khedive of Egypt some few years ago. Among the other well known steam and sailing yachts which have been turned out from the yard are the Varuna, Queen o' the May, Irene, Calluna and Ailsa.

The ship work now in hand at the yard consists of hulls Nos. 256, 265 and 267. The first of these is a single-screw fore-castle and bridge house cargo steamer, with a few passenger accommodations, for the British-India service. This ship, which is nearly ready for launching, possesses some excellent novelties and is of a highly developed type, as the basis of the design is the experience gained in the construction of many similar ships for the same service. The use of the masts for the stands of the cargo booms is done away with and instead some ten Sampson posts and booms are fitted about the hatches. The accommodations throughout are light and airy, as is necessary in the tropics, and there are several galleys and mess rooms for the different casts of the East Indian crew who will have nothing in common. The usual wooden rail top is supplanted by a railing iron, which is a section similar to the channel bar, with the exception that the outer faces of the flanges are half round. At present only the inner bottom flooring of No. 265 is in place. This is to be another single-screw cargo steamer for the British India Co., and in many ways similar to No. 256. The last, No. 267, is of the highly interesting type known as the Clyde river steamers, which run about the Clyde and Forth in conjunction with the passenger service of the railroads. Messrs. Inglis are well known builders of these steamers, and the present one is to excel their previous efforts in speed and handiness, therefore, the hull is extremely light, fine and shallow, and is to be fitted with day accommodations only. Paddle wheels, driven by directly connected engines, are used for propulsion.

The yard in which this work is carried on is an excellent example of the economy in space and complements by which the Clyde builders have advanced to such a high point in commercial building. It occupies a long narrow strip of ground between the eastern bank of the Kelvin river and a parallel city street and is separated from the Clyde by the street which leads to the ferry station at the junction of the Clyde and Kelvin. As the Kelvin is extremely narrow at this point the two sets of building and launching ways are placed at such an acute angle with the bank that a ship, although launched into the Kelvin, has the run allowed by the length of the check chains, etc., out upon the Clyde. Between the lower ends of the ways and the ferry street are the offices, small store houses and the frame furnaces, bending slabs and scrieve board, together with a few independent tools for punching and working the frames. The greater number of the tools are in the long row of sheds which form the eastern boundary of the yard and which are in line with the launching ways. The tools in these sheds consist of the conventional Scotch punches, shearing machines, planes, rolls, flanging machines, etc., and they are driven by belts from a main shaft.

A short distance above the launching ways and at the same acute angle with the stream is the slip dock or marine railway. This way is capable of docking two small cargo or river steamers at the same time, and it is usually occupied by one or two of the moderate-sized vessels which frequent the Clyde and its ports. A novel use to which it is often put, and one by which the economy of complement is illustrated, is that of launching light hulls, as of yachts, river steamers, etc. This peculiar duty is thus performed: Temporary blocks and staging are set up alongside the dock at such a distance as to allow the usual operations of docking to be freely conducted, and the hull to be constructed is then set up on these blocks. At the time for launching the hull is drawn on horizontal beams to the truck of the marine railway, which then lowers it to the water. This method leaves the two launching ways free for the construction of larger and heavier work.

On the river wall abreast the slip dock stands a large pair of shear legs, used for shipping heavy weights. Railway tracks run in and about the ways and the material for the different ships is stored at the most convenient points and passed about the yard by the conventional steam travelling crane. Beyond the power house of the slip dock stand the wood working buildings and lumber store. These consist of a large complete three-story building and an open shed for the spar makers. The first floor of the large building is used as the saw mill, and the second as a joiner shop, while the third forms a medium-sized mold loft and supplemental joiner shop with a model maker's room. The loft floor is about 160 ft. by 60 ft. Here lines are usually laid down on a contracted longitudinal scale rather than by the more common method for small lofts of dividing the longitudinal plan and overlapping the two portions which are on the full scale. The work of this loft is confined to fairing of offsets sent from the drawing room, so this method gives wholly satisfactory results and saves some little time.

Again beyond the building just described is a well fitted boiler shop, which forms the northern limits of the yard. It is fitted with all the usual steam-powered tools for boiler construction, and here Messrs. Inglis not only construct the boilers for their hulls, but also execute independent contracts. The engine shop, which is at its original site, some one and one-half miles up the river, possesses facilities for handling all types of high-class work, and here, as is the case in the boiler shop, they not only build the engines for their hulls, but also take in special work. It is hardly necessary to state that in the shops, as well as in the yard, the tools are of home manufacture and operated by Scotchmen.

GEORGE CROUSE COOK.

IMMENSE NEW GRAIN ELEVATOR.

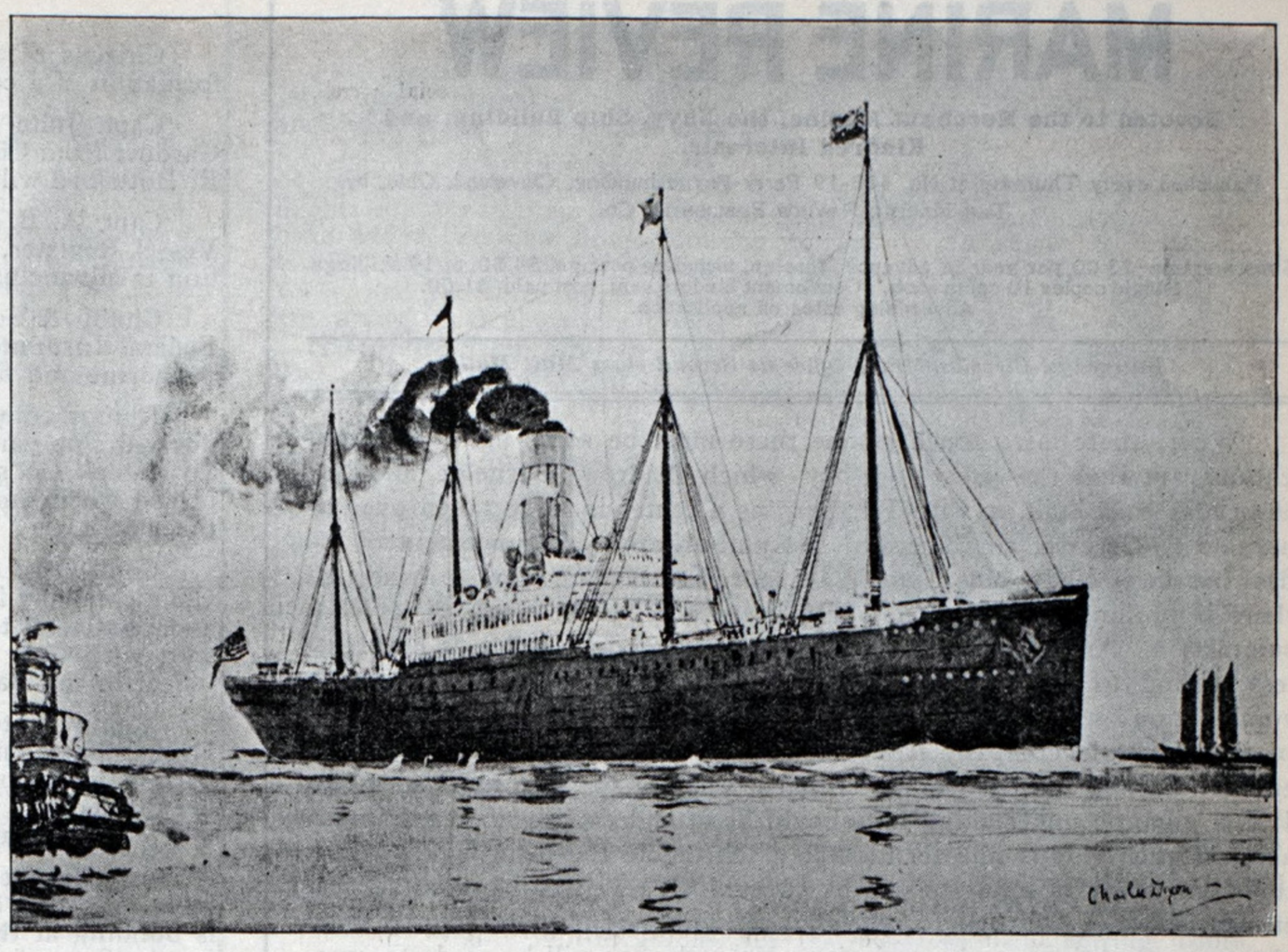
The MacDonald Engineering Co. has contracted to build at Chicago for Nye, Jenks & Co. an absolutely fireproof steel elevator of 1,300,000 bushels capacity, in which there will be no wood whatever. The elevator will consist of eighty steel bins, set on steel posts of immense strength, each encased in concrete. Not only will these bins hold grain, but some of the concaved triangles formed by their contact will do so, emptying at the bottom into the circular bins. The machinery of elevation, etc., will be carried in others of these triangles. Under this patent method of construction, the six lines of contact between each circular bin and those adjoining it will form a riveted steel beam, four times as thick as the wall of the bin. The floor below will be concrete arched between abutments. On the top of the bins, nearly 100 ft. in air, will be a second floor of concrete, where the work of the house will be carried on. The roof will be steel. When railroad cars, wheat laden, run into the building, there will be only as much wood therein as is in the cars. To preclude the possibility of fire from this trifle, a complete system of automatic sprinklers will be placed over the tracks. The machinery will be run by rope drives from an engine and shafting in a near by building. This elevator will cost 30 cents per bushel capacity; wooden houses do not cost less than 25 to 40; while a steel rectangular-binned elevator of 3,000,000 bushels being built at Duluth by the Great Northern road is costing about 70 cents per bushel. When the Nye-Jenks elevator is completed and filled with wheat there will be a weight of 75,000 tons set up on posts, with its base 20 ft. above the ground.

The American Bridge Co. is at present getting out about twenty bridges for the Erie Railroad Co. This company's sales during January were the largest since its organization, aggregating over 60,000 tons.

GREAT NORTHERN RAILWAY CO.'S LINERS.

The two steamships which are building at New London, Conn., for the Pacific trade of the Great Northern Railway, are attracting considerable attention abroad. The English papers take it kindly that the vessels are being built upon the Thames, for that is the name of the little stream that flows through New London. The English papers say that they resemble somewhat the latest steamships built by Harland & Wolff, Belfast, for the Atlantic intermediate carrying trade. "The vessels have considerable free board, four masts and one funnel, well located and harmoniously arranged," says one of the English trade journals. "For cargo carriers and money-earning vessels they are shapely, handsome craft."

These two large ships were thoroughly described in the last issue of the Review, so that it is only necessary to say that they are the largest in the world and have a dead weight carrying capacity at normal draught of 20,000 tons. They have a displacement of 33,000 tons. As a matter of comparison it is only necessary to state that the great Deutschland of the Hamburg-American line has a displacement of 23,000 tons, or 10,000 tons less than the Hill vessels. Of course these vessels are not as long as the ocean greyhounds, but they have great beam and greater depth and are designed more for profit than for speed. They will draw 33 ft. of water, for that is all the ports they touch will allow, but if ever the harbors are dredged the draught can be greatly increased. They will be great additions to the Pacific fleet.



CHARTS OF THE GREAT LAKES.

BY LIEUT COM JAMES H. BULL, U. S. NAVY.

For the safer navigation of the great lakes the navy department is proceeding with measures in keeping with the increased depths required by the fast-growing commerce of the day. In the earlier period of water communication on the lakes the light-draught vessels then used could safely navigate the different channels connecting the separate bodies of water, using ordinary caution. But today, with the heavier vessels, carrying enormous and valuable cargoes, a close investigation of certain localities is being carried on gradually to the end that unknown dangers may be discovered, their positions determined and proper safeguards be taken to avoid damage from them to shipping. To be understood properly the subject of charting the lake system and the application in its best form to the uses of the mariner, it must be considered somewhat in detail. In the first place, there was, in 1855, an appropriation for the survey of the northern and northwestern lakes. The work was intrusted to the United States engineers under the war department and so continued until 1895, a period of forty years. The results of this work were published in sections, which were very large in scale and very awkward for the use of the mariner. Beside, they contained only a plan of the American shore line and adjacent water, as the survey did not extend beyond the international boundary. Later the war department provided charts on a smaller scale, comprising areas including each lake, and giving an outline, without soundings, of the Canadian shores. These charts were all constructed on what is known as the polyconic projection, in which the meridians are straight lines, diverging from pole toward equator, and the parallels are sections of circles. To explain more definitely, suppose a drawing were made on the surface of a frustrum of a cone, with parallels and meridians at equal distances, and a cutting be made along one of the meridians. Then when laid out flat, the surface would be practically the chart of the polyconic projection. The name obtains from the use of many cones, the development of which for each parallel of latitude forms the projective.

Second only in importance were the charts made of the Canadian shores, under the direction of the dominion government. The data obtained for these were sent to the British admiralty in London and the charts were there constructed. Although very useful to the American mariner on the lakes, it was not without some difficulty that he could obtain them. The necessity of these to American shipping interests was recognized by the hydrographic office of the navy department, which has placed the data within easy reach.

Third, the surveys of the U. S. S. Michigan during the open seasons of the last ten years, under the direction of the navy department in localities which have required special attention owing to discovered dangers not heretofore plotted. The work of the Michigan has been confined principally to the channels and western approaches to the Straits of Mackinac, where the bottom is covered with boulders of varying size, a serious menace to the deep-draught vessels now plying those waters. During the last season the Michigan was at work within a small triangle in the Gray's reef passage. It was in this section that the steamer Pathfinder struck an unknown rock and afterward, last season, the Malietoa also found it, much to the damage of both vessels. The Michigan's surveys have been charted and issued in eight sheets, in complete form, for navigation.

To combine these different surveys and to make them of practical use to the lake mariner has been and is now the work of the hydrographic office of the navy department. The number of these charts, issued on Mercator's projection, the system long employed for deep-sea work, aggregates, at the present time, forty-seven. At first the advent of the navy charts on the Mercator projection was not received with favor by the lake-steamer captains. But since they have found the method of straight lines, for the meridians and parallels, as well as for laying the course direct, and the system of measurement in either sea or statute miles as desired, they would not give up the present charts. Their advantage is recognized in their simplicity and the avoidance of chance of error in their use. Of the forty-seven charts, four are prepared from meteorological data, combined in shape for practical navigation as regards conditions of storm, fog and ice. Eight have already been mentioned as complete surveys by the Michigan, while twenty others are republished from British admiralty publications of the Canadian shores of Lake Huron, Georgian bay, Lake Erie and Lake Ontario, thus being placed within the reach of the American seaman. Six other charts are of harbors, republished from drawings made under the appropriations for rivers and harbors, and included in the publications of the war department as illustrations of the work done by the army engineers. These not being available to the seaman, they were made so by the hydroghaphic office issuing them in regular form. Six more are general charts of the different lakes and of the St. Clair river, compiled from the results of the surveys of the United States and Great Britain, and supplemented by the data obtained by the officers of the U. S. S. Michigan. The remaining three charts are transformations from those made by the office of the survey of the northern and northwestern lakes. The hydrographic office made two of them, that of the Straits of Mackinac and that of Green bay, on Mercator's projection, beside reducing the scale and limits, while that of Eagle harbor was simply changed in size for convenience in use.

In his annual report made last November, the chief of bureau of equipment, under whose authority is placed the hydrographic office, dwells upon the necessity of the navy assuming control of all surveys on the lakes, as he believes that it is more familiar with the needs and requirements for safe navigation than any other department of the government. To quote from his report: "Whatever decision may be reached with reference to the work of providing aids for the safe navigation of merchant vessels, the navy must provide accurate charts for the use of its own ships on the great lakes. The waters of Lake Erie are historic in the annals of the navy; upon them was won one of the most brilliant naval victories in the history of the country. Who can say when another naval action may be fought in these waters or how soon it may be necessary to transform peaceful merchant vessels into fighting ships? Whenever it may come, or even if it may never come, the navy must, at all times, be able to provide accurate means for the safe navigation of the ships of war now there or that may be there hereafter."

In order to assist the mariner in his selection of a chart for immediate or future use, a "Chart Index" is issued. This on one side represents the lake system and shows by an arrangement of numbered rectangles the spaces covered by the charts similarly numbered. For instance, if a steamer captain wishes a chart of Lake Erie, he looks upon the "index" and finds that the hydrographic chart No. 1665 suits his purpose. This he knows to be an issue by the hydrographic department, as it is marked by black lines—to distinguish from those of the war department, which are in blue, and the British admiralty, in red. On the other side of the "index" is given a list of charts with their numbers and general limits, and the prices for which they are sold. The navy department has arranged for such sale by establishing agencies at different places (among them the Marine Review Pub. Co. of Cleveland), and has fixed the purchase prices at regular figures. These have recently been reduced about 50 per cent., making the purchase of many charts a trifling expense to those who are obliged to use them. In addition to this, the branch hydrographic offices in the lake cities have a full set of all charts of the world for reference purposes, so that anyone can obtain information regarding the deep sea, as well as the changes pertaining to the navigation of the lakes. The branch offices also distribute, without charge, weekly "Notices to Mariners" and anyone interested can have his name put upon the list of addresses. These publications of the hydrographic office give all particulars relating to alterations in buoyage and lights, as well as descriptions of all dangers to navigation. Its usefulness will undoubtedly increase as the commerce of the lakes grows in size.

The Chicago Nautical School Alumni held their fifth annual dinner at the Sherman house last week and a very enjoyable time was the result. Capt. Walter D. Hamilton presided and took occasion to congratulate Mr. Wilson, principal of the school, on the marked change in public opinion among the lake captains and others in regard to the necessity for better and more exact knowledge of their profession. The school now has sixty pupils of all grades and includes many captains who, although they hold master's papers for the lakes, are acquiring the deep water course.

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Where there is so much smoke there must be some fire. The indications are that the great industry which Andrew Carnegie and his associates have built up with Pittsburg as a center is to be taken over by another and greater combination. No authoritative announcement of the deal has been made, but it would be more astonishing now to hear that there is nothing in it than it would be to receive the news of its consummation. Andrew Carnegie, though not an anxious seller, is nevertheless willing to retire permanently from the steel making business. A combination of the various steel interests is sure to follow the retirement of the Carnegie company from the independent field. Such a plan is entirely feasible and the wonder is that it was not put into motion earlier. It is a gigantic undertaking but should be attended with no insurmountable difficulty. It is idle to attempt to chronicle the terms upon which this community of interests will be effected. There are many conflicting stories, but it is sufficient to note that the minority is to be treated upon the same conditions as the majority. No endeavor will be made to exercise the advantage of power upon the minority. The rights of each are sacred and each will share alike. Men like these win not by crushing but by disarming opposition. Meanwhile our friends across the water are viewing the trend of events with the liveliest possible interest and the keenest possible insight. With the courage that is born of the race they hold that American competition is not to be feared but to be fought. War develops both individuals and nations. The Engineer of London says:

"Before all things it seems to be desirable that in a commercial war we should know whom we are going to fight. So far as we can gather this is a matter upon which ignorance and misconception exist. Thus we hear much about United States competition. Has any attempt been made to ascertain how far the population of the United States as a body has promoted competition or threatens our supremacy? We have already taken care to point out that what we have mainly to fear are two or three cities for the most part in the eastern states. Probably nothing further west of Chicago is of serious import. But we shall now push the argument further and state plainly that our real competitors are a comparatively small number of men. The leaders are probably not more than a dozen; and it is because they are so few in number that they are dangerous. Be it remembered that all the great movements have originated with and generally been carried through by a few individuals of transcendent ability."

This is the first recognition we have seen in the English press of the actual condition in the United States. England, Germany and France, and indeed the whole manufacturing world have facing them a small group of exceedingly able and energetic men. If these men determine to control a trade they can get it. The Engineer quotes Mr. John D. Rockefeller's testimony before the industrial commission—one of the simplest and clearest arguments wherein a combination of interests may work for the public good that has ever been written. The Engineer also scoffs at the wail that England's weakness lies in the lack of technical education. These Americans, among them the most competent and talented men that have ever lived, know nothing of technical education. The group of men concerned in the present industrial movement have money enough to take over the various properties or have credit enough to obtain what they lack; and from what we know of their character, foremost among whom must be named Mr. Rockefeller, no one need fear the most scrupulous, faithful and intelligent administration of the property.

Some of the manufacturers of Boston and other large ports on the Atlantic seaboard, whose products find a market among ship builders and ship owners, are doing just what should be done by vessel interests all over the country. They are urging upon their senators and congressmen the importance of the shipping bill from a business standpoint. One of the officers of the Boston & Lockport Block Co. says: "We have letters from senators and congressmen of the state assuring us of their interest in this measure and telling us that they will give it their best attention. Why not ask readers of the Review all over the country to take up a correspondence with their representatives along this same line. While we do not consider this bill perfect in all its parts, we do think it is a move in the right direction and we should at this time accept as satisfactory the best bill that can be passed."

Connecticut, Louisiana, Tennessee and Washington have been selected as the names of the four warships authorized by the house of representatives and the bill for the construction of which is now pending in the senate.

AROUND THE GREAT LAKES.

Citizens of Sandwich, Ont., on the Detroit river, are talking of the formation of a company for the construction of a dry dock.

Capt. John C. Pringle of St. Clair has bought the schooner F. B. Gardner from Connelly Bros. of Buffalo. The Gardner with the schooner R. Bottsford will tow with the steamer D. Leuty.

Capt. A. B. Drake of Buffalo, chief inspector for the Inland Lloyd's Vessel Register, has a large corps of surveyors at work, and the inspection is advancing in a way that insures early publication of the register.

Chubb & Son of New York have been instrumental in forming the Federal Insurance Co. ($500,000 capital and $500,000 surplus), to engage in marine and fire insurance. Lake and ocean risks are to be assumed.

Rumor connects the name of Edward Gaskin of Buffalo with a dry dock or ship yard project. Mr. Gaskin, who was in charge of the Union Dry Dock Co.'s plant at Buffalo for a great number of years, was displaced when the American Ship Building Co. (consolidation) purchased the works.

Capt. Geo. A. Symes, who has been in the employ of the Cleveland-Cliffs company for the past five years as master of their steamers Cadillac and Pontiac, is to take up a real estate, loan and insurance business in Detroit with Geo. E. Kingsley. The firm will be Kingsley & Symes, with offices in the Bamlet building.

Major Clinton B. Sears, a very efficient and energetic member of the United States engineer corps who has for several years been in charge of harbor improvements on Lake Superior with headquarters at Duluth, has been ordered to the Philippines. Major D. W. Lockwood of St. Paul will take charge temporarily of the Duluth office.

A fueling scow of 170 ft. length and 600 to 700 tons coal capacity will be in operation at Conneaut about the opening of navigation. The vessel is building at the Milwaukee works of the American Ship Building Co. for the Carnegie interests at Conneaut, and her equipment, of course, will be modern in every way. The Alice Richards, formerly used for fueling purposes at Conneaut, is to be operated in Cleveland during the coming season by the Ohio Fuel Co.

Capt. M. Mulholland, who now has offices in the Wade building, Cleveland, has left for the east, in the first attempt to introduce his hatch fasteners on salt water vessels. He has arranged thus far for the application of about 20,000 of the fasteners to hatch covers of lake vessels. Among lake vessels for which the fasteners have lately been ordered are the Castalia, Bradley and Goshawk, Sauber, City of London, Phoenix and Ketchum. The government is to make a trial of the device at once on one of the army transports.

After paying on preferred stock quarterly dividends of 1¾ per cent. for one year (7 per cent. per annum), directors of the Great Lakes Towing Co. announce a suspension in this regard. In a circular to stockholders they say they had undivided profits amounting to $90,504.97 on Dec. 30 last, after meeting all obligations up to that time, and expect to pay the full 7 per cent. dividend on the preferred stock during the present year, but have postponed it for the purpose of being more abundantly prepared to meet competition of the kind encountered during the past year.

It is announced that the package freight steamer Kearsarge, one of the most successful vessels of her kind on the lakes, has again been chartered outright for the season of 1901 by Pickands, Mather & Co. of Cleveland to the Canada-Atlantic Transit Co. for service between Duluth and Parry Sound. The terms are private. The statement that the charter is equal to 75 cents a ton on iron ore does not come from interested parties on either side. The charter price last year was $80,000, out of which the owners had only insurance to pay. Half that amount would be considerably better than 75-cent ore for a steamer like the Kearsarge.

Capt. Alex. J. McKay, of the Detroit lodge, Ship Masters' Association, is being showered with honors as a result of the efficient manner in which he attended to the duties of president of the grand lodge of that organization during the past year. First he was presented with a series of resolutions from the grand lodge commending his services, especially in securing modification of the ruling of the steamboat inspection service to the effect that all license holders be re-examined every five years upon applying for renewal of their papers. Then Capt. McKay's home lodge at Detroit congratulated him on this same score and in general recognition of the esteem in which he is held by his associates presented him with a diamond ring. The presentation speech was of a very happy kind and was made by Capt. L. M. Stoddard. The committee in charge of the testimonial exercises was composed of Geo. Merritt, Hiram Still and H. H. Parsons.

"The cost of launching a battleship," says an officer of the Wm. Cramp & Sons Co., "is $4,000 to $8,000. The building of the ways for the ship to slide down over is the main item, and then comes the greasing. Every inch of timber over which the vessel slides must be covered with a lubricant. Different firms use different substances, but soap and tallow form the main ingredients of them all. At the Cramp's we use a layer of beef tallow and a layer of soft soap, and, taken together, between one and a half tons of the stuff is required to put a move on the average battleship. The tallow is spread on first, to the depth of about three fingers, and the workmen use big flat trowels to make the surface as smooth as possible. Then they pour over the soft soap, which is just thick enough to run, or about the consistency of tar. As a general thing, the double coating answers the purpose admirably, and the ship glides into the water as if it was sailing on air. If it sticks, as has happened in a few cases, it is likely to spring some of the vessel's plates, and accidents of that kind are so costly that nothing is spared to avert them."

Mr. J. C. Gilchrist of Cleveland, who has been buying up the best of the wooden vessels of the lakes in all cases where he can get prices down to his way of figuring, says he has planned upon paying about $20 per ton of carrying capacity for the wooden steamers, as against $42 to $44 per ton capacity now being paid for steel freight steamers building in lake ship yards.

DEATH OF CAPT. JAMES S. DUNHAM.

Capt. James S. Dunham, who was for a great number of years a leading figure in lake shipping circles, and three years ago president of the Lake Carriers' Association, died at his home, No. 29 Bellevue place, Chicago, last week. His death was due to neuralgia of the heart. While he had been in ill health all winter it was not supposed that he was seriously ill. He was up and around the house during the week. The end, indeed, came within twenty minutes after the attack. Capt. Dunham was born in Washington county, New York, Jan. 30, 1837. At the age of fourteen years he was employed as a steamboat hand on the Hudson river at a salary of $3 per week. Six years later he was promoted to the command of a tug and went to Chicago, where he purchased a two-thirds interest in the tug A. C. Gunnison. He sailed the Gunnison through the Illinois and Michigan canal and the Illinois and Mississippi rivers to New Orleans, where he engaged in the towing business with great success until the outbreak of the civil war.

When the war began all his property, with the exception of the Gunnison, was confiscated by the confederate government. With his remaining tug Capt. Dunham went to Mobile, where he was compelled to do work for the enemy. As soon as opportunity offered he took his boat to Pensacola, where it was confiscated and Capt. Dunham arrested as a northern sympathizer and sent north on the first train. Soon after his arrival in the north he built the tug Little Giant, named for Stephen A. Douglas, and came to Chicago via the Hudson river, the Erie canal, and the lakes. In the course of time he founded the Dunham Towing & Wrecking Co., of which he became president. In 1899 he disposed of his interests in the company to the Great Lakes Towing Co., and since that time had devoted himself to the management of other steamboat interests. Capt. Dunham was a member of the Chicago Lake Line Agents' Association, the Chicago River Association, the Chicago Steamship Co. and the Chicago Transit Co. Aside from his shipping interests, he had been for years a member of the board of trade and had served on all committees of that body pertaining to commerce. He was also instrumental in securing the attention of congress to the Chicago river. He was a member of the Union League and Marquette clubs, and in politics represented his ward as alderman. Capt. Dunham was married to Miss Maly Ellen Brown of Ashtabula, O., in 1867. His wife and three children, Robert J., Ella M., and Anna, survive him.

The following resolutions on the death of Capt. Dunham were adopted by the Chicago Lake Line Agents' Association at a special meeting:

Whereas, it has pleased a Divine Providence to take from our midst our esteemed and beloved fellow member, Capt. James S. Dunham, long and prominently identified with marine affairs, and this association having received news of his death with profound sorrow and regret, it is

Resolved, that this association, deeply recognizing the ability, uprightness of character and lovable qualities of the deceased, and feeling that as a friend his place cannot be filled in our hearts, and that we have lost an associate whose counsel was of great value to us, desire to make known in this way their deep sorrow at his loss, both as a business associate and friend; and it is further

Resolved, that we extend to the members of his family our most sincere and heartfelt sympathy in this, their hour of great sorrow and overwhelming bereavement; and be it further

Resolved, that a copy of these resolutions be presented to them.

These resolutions are signed by T. T. Morford, president, and J. C. Evans, secretary.

Officers of the reorganized Iowa Iron Works of Dubuque, Ia., are: President, Peter Kiene; vice-president and superintendent, Wm. Hopkins; secretary, F. G. Hornbogen; treasurer and manager, W. W. Bonson. Capital stock of the new company is $50,000, of which $25,000 has been paid in. The gentlemen now in charge of these works have been successful in other industrial enterprises and will undertake gradually and carefully to build up, especially in marine lines, a business for a concern that had a good beginning and which can undoubtedly be made successful by capable management. Mr. Bonson will give his entire time to the new company. Messrs. Hopkins and Hornbogen, the superintendent and secretary, are men well fitted for their positions.

The Long Island Sound steamboat Connecticut, with oscillating engines, has had her machinery completely overhauled and had a successful trial trip last week. The Connecticut is a spare boat of the New York, New Haven & Hartford Railroad Co.'s fleet. She was built in 1888, as a result of the promising showing made with the freight boat Nashua of the same line with similar engines. The Connecticut has not been a success and it is rumored that the railroad company is seriously considering selling her.

The International Navigation Co.'s liners, building at the yard of the Wm. Cramp & Sons Co., Philadelphia, are now being framed out. All the double bottom framing is in position and about one-fifth of the frames have been erected. These vessels are much larger than the St. Paul of the American line, now undergoing repairs at the same yard.

No further trial trips will be made with the Bagley, Barney and Biddle, building by the Bath Iron Works, until spring. These torpedo boats have a guaranteed speed of 28 knots per hour.

GEORGE B. CARPENTER & CO.

George B. Carpenter & Co. of Chicago have finished remodeling and have finally restocked the building at the corner of South Water street and Fifth avenue. They now have one of the best appointed warehouses and salesrooms of any firm in this country in their line. They have added two new floors, containing about 10,000 ft. of floor space, and the three upper floors are carried on steel girders, giving a clear floor from wall to wall. Two of these are devoted to sail lofts, of which one is devoted exclusively to yacht sails. The firm has the largest yacht sail trade in the west and it is rapidly growing, as they keep right up to date, have the capital and skill and spare neither pains nor expense to enable them to turn out the best.

Store and Offices, Fifth Ave. and S. Water St.

An instance was detailed of tests resorted to in order to demonstrate the advisability of machine-made versus hand-made sails, in which various kinds of machine and hand sewing were resorted to and the seams torn apart by putting a measured amount of power on them by differential pulley blocks. The results showed that there was but one combination that would hold until the canvas was torn in two and it showed that machine sewing with that thread cost as much as hand sewing, sometimes a little more, but made a flatter sail. This combination was then adopted, and all sails are now made in such a way that the firm has no complaints of poor sewing on its sails, and their fit and cut are such as to constantly add to the reputation of the house, until it is coming to be understood that all racing sails shall be made by "Carpenter." They have a long list of cup defenders and challengers whose sails they have furnished, including all the prominent lake events for the past ten years.

GEO. B. CARPENTER & CO. WAREHOUSE
WATERPROOF COVERS TENTS & AWNINGS
TWINES & CORDAGE
MARINE HARDWARE
CHICAGO WIRE & TWINE CO. RAILROAD & MILL SUPPLIES
GEO. B. CARPENTER & CO.
WAREHOUSE
STORE & OFFICE FIFTH AVE. & WATER ST.
GEO. B. CARPENTER & CO.

The trade in sails for working boats is also heavy, and while steam is rapidly driving sailing craft out of business, still this house manages to hold its own so well that while others have been forced out of sail making altogether, it still devotes an entire floor to heavy sails. The trade of the house in ship chandlery extends all over the country, a recent order for 56,000 lbs. of stud link chain and 12,000 lbs. of Trotman anchors furnished a vessel in San Francisco being regarded as nothing out of the ordinary, while they have a steady trade in Baltimore and other Atlantic ports.

A new addition to the warehouse on the north side has also been recently necessitated and four stories, 50 by 100 ft. were added there. The office on South Water street has been elegantly fitted up in polished wood. telephones at every desk and a pneumatic tube system for orders and messages, while a passenger elevator has been put in to carry customers to the various floors with ease and comfort.

TWIN-SCREW STEAM YACHT ALVINA.

The twin-screw steam yacht Alvina, launched at the yards of the Harlan & Hollingsworth Co., Wilmington, Del., only two weeks ago, will be one of the finest of the new pleasure craft of the coming season. She was christened by Miss Harriet Mary Fletcher of Providence, R. I., a granddaughter of Mr. Charles Fletcher of Providence, R. I., for whom the yacht is being built. The dimensions of the vessel are: Length along rail, top of waist, 212 ft.; length on load water line, 176 ft.; breadth, molded, 25 ft. 11½ in.; depth from top of keel to top of deck beams at center, 16 ft. 9 in. The yacht has a clipper stem and square stern with one continuous deck house. On the forward end of the main deck there is a forecastle deck with crew's galley, lamp room, laundry, crew's mess, firemen's quarters, crew's lavatories, and a steam windlass. Abreast part of the deck house there is a bridge extending to the side of vessel. Above the main house is a chart house and captain's stateroom. Accommodations for crew and officers are forward on the cabin deck and for the owner forward and aft of the cabin deck. In the forward end of the house is the dining room, followed aft by pantry, owners' galley, a drying room and closet. In the after part of the house is a library and stateroom. The vessel is to rate 100A at Lloyd's and is to be of 14 knots speed. The engines, twin-screw, have cylinders of 12, 21 and 35 in. diameter by 22 in. stroke and will be supplied with steam by two Scotch boilers of 13 ft. diameter and 10 ft. 6 in. length, allowed 185 lbs. pressure per square inch. There are three furnaces in each boiler. Natural draft only will be used. A donkey boiler is 3 ft. 10 in. in diameter and 7 ft. length. Other features of equipment are: Electric light plant for 150 lights; steam and hand steering gear; complete water tanks; evaporator and distiller; ice plant; Hyde windlass and capstan; two masts of Oregon pine; steel deck house; joinery of hardwood.

OLD SALEM PRIVATEER AMERICA.

B. B. Crowninshield, the Boston naval architect who has designed the Lawson cup defender, has written for the Essex institute historical collection the history of the famous Salem privateer America. Four ships called America were owned by the firm of George Crowninshield & Sons of Salem. The first was a prize captured during the revolutionary war, and was brought into Salem in 1783. She was afterwards sold at auction and her name changed from Pompey to America. The second was a French vessel bought for Elias Hasket Derby at the Isle of France. The Crowninshields later bought her and named her America. This ship brought the first elephant to the United States, arriving from Calcutta in April, 1797. The third ship named America was a frigate-built ship, formerly belonging to the French navy, and was bought at Bordeaux, France, for the Crowninshields, her name then being Blonde. She arrived at Salem in October, 1798, and was found to be too large to lie at any of the wharves, and a pier was built for her special use. But it was the fourth America, built by Retire Becket under the direction of Capt. George Crowninshield, that became the famous privateer of Salem in the war of 1812.

When first launched this vessel was 114 ft. long, 30 ft. 8 in. beam, 15 ft. 4 in. depth, 14 ft. 3 in. draught and of 473 tons. She was described in her original certificate of registry as being square-rigged on three masts, having two decks and an image head. Her figure head was a full length likeness of an American Indian chief being chased by a white dog. This was made by Edward Dorr, who also made her windlass and capstan. She was built for the East India trade, and started on her first voyage for Sumatra July 2, 1804, in command of Benjamin Crowninshield, Jr., Elias Davison of Gloucester being chief officer and Nathaniel Leverett Rogers clerk. In those days all merchantmen were armed, and the America carried ten nine-pounders and a crew of thirty-five men.

In 1805 the America made a voyage ostensibly to Sumatra, but it was rumored that she had gone instead to Mocha. As this would not be the first time that she had disobeyed orders, the owners became very anxious, and upon receiving news that the ship had been sighted on her return, some of them put off in a sail boat to meet her. On nearing the ship, some thought they scented coffee; others, mistrusting their olfactories, were less confident; but, approaching closer, the fragrant odor seemed to grow more unmistakable, until an old salt suggested that it might be after all only the scent of a fresh pot wafted from the galley. Hereupon, hardly within hailing distance, Benjamin W. Crowninshield, an owner, seizing the speaking trumpet, shouted, forgetful of the usual courtesies, "What's your cargo?"

"Pepper," came the doleful reply over the waters from Capt. Benjamin Crowninshield, who perfectly saw through the matter.

"You lie," roared the owner through his trumpet. "I smell coffee." And so it was soon found to be. The ship, shortly after, proceeding to Holland, netted a profit of considerably more than $100,000 on this cargo.

When the war of 1812 broke out it was decided to fit the America out for a privateer. Her upper deck was removed and her sides filled in solid between planking and ceiling like the sides of a man-of-war. Her battery was changed from time to time, guns from prizes being mounted in place of inferior ones already on the ship. The America was no fair weather sailor. Under short sail, "fresh and squally," she had made for thirteen consecutive hours a rate of speed just below 9½ knots an hour. On her third cruise she carried eighteen long nine-pounders, which were procured by B. W. Crowninshield, then secretary of the navy, from the Charlestown navy yard; two long 6-pounders, two eighteen-pound carronades, and forty muskets, four blunderbusses, fifty-five pistols, seventy-three cutlasses, ten top muskets, thirty-six tomahawks, or boarding axes, and thirty-nine boarding pikes. Her crew numbered about 150 men.

The America was unquestionably the fastest sailing vessel afloat during the war, and was never captured, although continually chased by English cruisers. She always escaped with the greatest ease. The greatest speed mentioned in her log is 13 knots. It is mentioned often. She made five cruises: Sept. 7, 1812, to Jan. 8, 1813, commanded by Joseph Ropes; March 29, 1813, to July 21, 1813, commanded by John Kehew; Dec. 3, 1813, to March 31, 1814, commanded by James Chever, Jr.; Oct. 31, 1814, to Nov. 5, 1814, commanded by James Chever, Jr.; Nov. 24, 1814, to April 8, 1815, commanded by James Chever, Jr. During these cruises she safely sent into port twenty-seven prizes in all, valued at $1,100,000.

After her arrival from the last cruise in 1815, the America lay at Crowninshield's wharf until June, 1831, during which time she had been repaired and coppered, with the expectation of selling her to go to South America. A half interest in her was sold at auction for $4,000 in 1818. But for some unexplained reason she was never again put in commission, and lay at the head of the wharf very near the locality where she was built, until she was unseaworthy. She was sold at auction June 23, 1831, and broken up. The last of her long guns were sold to the government about 1850, and were then taken away to be melted up. Two of the long 9-pounders were sold to Messrs. Robinson & Pierce, and went to China in their brig Boxer on her first voyage. One of her carronades is now mounted in front of the house at Marblehead.

SEVEN-MASTER TO BE BUILT.

The biggest schooner the world has ever seen (a wooden vessel) will be constructed this summer at the yard of John P. Gordon in Franklin, on Frenchman's bay, Maine. She is to be a seven-master, much larger than either of the two six-masters built in Maine last year—the Eleanor A. Percy and the George W. Wells. These six-masters are 3,142 and 2,743 tons net, respectively, and about 300 ft. on the keel. The Franklin vessel is to be 335 ft. on the keel, 54 ft. beam, 32 ft. depth of hold, 18 ft. draught in light trim and about 4,000 tons net register. The frame is to be cut in the Maine woods not far from Gordon's yard and is to be the heaviest ever put into a vessel in Maine. Sawyer Bros. of Mill Bridge, famous ship builders, will have charge of the work, and it is expected that the frames will be up before the Fourth of July. The vessel is to be owned in quarter shares by John Paul Gordon of Franklin, Crabtree & Havey of North Sullivan, Dunbar Bros. of Sullivan and Capt. Orlando Foss, who will command her. It is expected that she will cost about $155,000.

MONTHLY REPORT OF NAVAL CONSTRUCTION.

The monthly report of the naval board of construction shows that steady progress has been made upon the naval vessels. The Wisconsin, having gone into commission during the past week, is removed from the list of vessels under construction. The three sheathed battleships and six armored cruisers are assigned by numbers to the various ship builders. Their names have not yet been apportioned.

Following is the summary:

		Degree of completion, Per cent. Jan. 1.	Feb. 1.
BATTLESHIPS.			
Illinois	Newport News	87	88
Maine	Cramp & Sons	40	42
Missouri	Newport News	21	23
Ohio	Union Iron Works	36	37
No. 13	Newport News		0
No. 14	Moran Bros. Co.		0
No. 15	Bath Iron Works		0
ARMORED CRUISERS.			
No. 4	Cramp & Sons		0
No. 5	Newport News		0
No. 6	Union Iron Works		0
No. 7	Cramp & Sons		0
No. 8	Newport News		0
No. 9	Union Iron Works		0
SHEATHED PROTECTED CRUISERS.			
Denver	Neafie & Levy	37	38
Des Moines	Fore River Engine Co.	12	15
Chattanooga	Lewis Nixon	17	19
Galveston	Wm. R. Trigg Co.	6	9
Tacoma	Union Iron Works	13	14
Cleveland	Bath Iron Works	40	44
MONITORS.			
Arkansas	Newport News	46	47
Nevada	Bath Iron Works	76	79
Florida	Lewis Nixon	56	59
Wyoming	Union Iron Works	65	68
TORPEDO BOAT DESTROYERS.			
Bainbridge	Neafie & Levy	86	88
Barry	Neafie & Levy	84	86
Chauncey	Neafie & Levy	84	87
Dale	Wm. R. Trigg Co.	88	90
Decatur	Wm. R. Trigg Co.	88	90
Hopkins	Harlan & Hollingsworth	70	70
Hull	Harlan & Hollingsworth	69	69
Lawrence	Fore River Engine Co.	99	99
MacDonough	Fore River Engine Co.	98	98
Paul Jones	Union Iron Works	80	82
Perry	Union Iron Works	85	89
Preble	Union Iron Works	80	82
Stewart	Gas Engine & Power Co.	45	47
Truxton	Maryland Steel Co.	51	54
Whipple	Maryland Steel Co.	50	53
Worden	Maryland Steel Co.	49	53
TORPEDO BOATS.			
Stringham	Harlan & Hollingsworth	98	98
Goldsborough	Wolff & Zwicker	99	99
Bailey	Gas Engine & Power Co.	99	99
Bagley	Bath Iron Works	98	98
Barney	Bath Iron Works	99	99
Biddle	Bath Iron Works	96	97
Blakely	Geo. Lawley & Son	97	98
DeLong	Geo. Lawley & Son	97	98
Nicholson	Lewis Nixon	83	84
O'Brien	Lewis Nixon	86	88
Shubbrick	Wm. R. Trigg Co.	97	97
Stockton	Wm. R. Trigg Co.	99	99
Thornton	Wm. R. Trigg Co.	93	95
Tingey	Columbian Iron Works	67	67
Wilkes	Gas Engine & Power Co.	70	75
SUBMARINE TORPEDO BOATS.			
Plunger	Lewis Nixon	3	5
Adder	Lewis Nixon	20	27
Grampus	Union Iron Works	2	6
Moccasin	Lewis Nixon	11	18
Pike	Union Iron Works	2	5
Porpoise	Lewis Nixon	10	15
Shark	Lewis Nixon	10	12

VESSELS PURCHASED DURING SPANISH WAR.

Secretary Long of the navy department has sent to congress a list showing the vessels purchased for the navy before and during the war with Spain, together with their cost, and a list of those which have since been sold or transferred to the war department. Their number is 102 and their total cost was $18,045,850. The vessels sold and their cost and selling price were:

	Cost	Sold for	Purchaser
Niagara	$200,000	$ 75,500	
Badger	367,000	135,000	War department
Resolute	475,000	260,000	War department
Viking	30,000	30,000	War department
Vulcan	350,000	175,750	
Gov. Russell	71,000	25,000	
East Boston	57,500	38,091	
Cassius	160,594	160,594	War department
Scipio	85,769	80,125	
Enquirer	80,000	20,000	
Seminole	25,000	6,500	War department
Cheyenne	6,500	1,690	War department
Kanawha	50,000	50,000	War department
Hector	200,000	65,150	

James McKay & Co., chain manufacturers of Pittsburg, have for more than a year been filled up with orders three to five months ahead of their operation, and will undoubtedly be pleased therefore to get into their new plant some few months hence. The new works will give them about three times their present capacity.

Chamberlain & Scott of Chicago have been awarded the contract for raising the wreck of the Maine and Alfonso XIII in Havana harbor. They are to keep the wrecks and will receive their profits from the sale of souvenirs, 3 per cent. of which they have agreed to give to the government.

MARINE INSURANCE ON THE GREAT LAKES.

Buffalo, Feb. 13.—A talk on marine insurance, lately obtained from Buffalo underwriters in connection with a reference to last week's conference here by the members of the Gadsden cargo pool, ought to throw some light on the situation, present and prospective. Last season was not very stormy and may turn out to be a fair average one, yet the best figures anywhere shown on the business foot up not more than 11 per cent. profit, while some come out about even.

"We are clean to the bottom, as regards running this business at a profit," said more than one agent on the subject. "The past season shows it. The profit for sometime has been so small on the average that it has not attracted any new capital into our offices, badly as we sometimes need it. As to office expenses and commissions, they are about as close as they can possibly be made. Think of the condition of things as compared with a dozen to twenty years ago. Commissions were then 25 per cent. and sometimes even more. Now they are never more than 15. On the other hand, it costs more to write a policy now than it did then. Our old-time insurance agents did as they pleased. They made such rates as suited them and then they sat down in their offices and the business came to them. It had to. But it is very shy now. We get the big lines only by going out and teasing for them, and sometimes we don't get them then. I could show you some very pretty expense accounts run up when out gunning for insurance. All this has to be paid by the agent.

"As to the actual rates, especially on hulls, they have gone down steadily of late. Even the low-class hull rates have not gone up, but have stood about still. The reason that the vessel owners can't pay them is because they don't get the freights that they used to. It is not so long ago that grain paid 10 cents out of Chicago. Now it is sometimes less than a cent and a profit is only possible on big cargoes. That is the reason why the small and low-class craft cannot pay insurance.

"I find that as a rule the agent who makes any money on anything but strictly first-class hulls does it by taking large lines on the second and lower classes. A mere flyer is sure to lose. I know an agency that has always made money on classes below A1, but they took the business on a large scale, and that saved them. Late figures show that even such takings are growing more risky. There are next to no wooden vessels coming out now, and, of course, the existing ones are getting softer and softer every season. Nobody expects to make anything of account on wooden vessels from this time on, and the figures now make it pretty plain that all profit on them is about at an end."

The above, and more to the same purpose obtained from the most authentic sources, shows pretty conclusively that the showing of the lake underwriters is not even in sight of the old clover fields that the business used to revel in, and it is not likely to get back there right away, if it ever does. Still this is the tendency of practically all sorts of business. It is the survival of the fittest. The rest go. We complain of the big concerns as often as we see a small one go to the wall, but it is the rule of modern business. Venture large, sail on deep water, or go fast on the bottom, is the rule. And all this in order that the individual may live better and have a better, not an easier, time than he used to. There is practically no business that does not show the same tendency.

There is but one thing for the vessel owner who cannot pay the existing hull rates. He must take his own chances. There is no such thing as breaking rates down now. The entire insurance capital in the lake business has to be used as a unit too often to cover the larger risks, for it to disagree on rates, or anything else. Freights will remain low. That is another of the endless tendencies towards the interest of the consumer. Where is it all going to end? JOHN CHAMBERLIN.

ARE BATTLESHIPS TO HAVE SUPERPOSED TURRETS?

An important decision relative to the battery arrangement of the seven battleships authorized and projected was reached by the naval board last week. The board decided to abandon the quadrilateral system of turrets adopted for the battleships Virginia and Rhode Island, and to equip them with the superposed turret system. The board further decided that in order to secure the greatest efficiency a homogeneous fleet is essential, and the armament of the seven vessels will be identical. Another meeting of the board will be held shortly, when a vote will be taken to determine the advisability of accepting the modification proposed by Rear Admiral O'Neil of the superposed system already adopted for the Pennsylvania, New Jersey and Georgia.

Much to the surprise of advocates of the superposed turret, more opposition developed to this system than had been anticipated. Though the precept under which the board convened specifically limited the discussion to the quadrilateral system, the superposed turret system, reenforced by waist turrets for the accommodation of 8-in. guns, and the suggestion of Rear Admiral O'Neil that the waist turrets be removed and four 6-in. guns be substituted, members of the board did not hesitate to propose other arrangements. One of the most important suggested was the removal of all turrets except two for the 12-in. guns, to be located forward and aft, and the installation of fourteen 8-in. guns, seven on each side, on the gun deck. The suggestion was not adopted. Members of the board were apparently loath, however, to abandon any of the 8-in. guns, which would be necessary if Admiral O'Neil's proposition were adopted. Admiral O'Neil explained that the removal of the waist turrets is necessary because the magazines provided for the ammunition of the 8-in. guns are directly opposite the boiler rooms and therefore in a dangerous position, and, besides, the position of the guns caused interference of fire.

George F. F. Wilde, recently commander of the battleship Oregon, has arrived at San Francisco en route to Washington, having been a short time ago detached from sea duty. Regarding naval requirement in the Philippines, Capt. Wilde said: "We ought to have several 500-ton ships, a great many of them for coast and inter-island service. The whole coast should be resurveyed. The charts are all wrong."

Representative Alexander at Washington Thursday introduced a bill in congress to authorize the secretary of the treasury to establish anchorage grounds in Buffalo harbor similar to those in the harbor of Chicago. It is expected that Buffalo harbor will be greatly crowded during the Pan-American exposition next summer and the object of the measure is to relieve inconvenience from that source as much as possible.

OUR SHIP BUILDING INDUSTRY.

ITS RELATION TO FOREIGN TRADE IS VERY ABLY DISCUSSED IN A DOCUMENT FROM THE TREASURY BUREAU OF STATISTICS—ECONOMIC CONDITIONS SURROUNDING THE PRESENT STATE OF SHIP BUILDING.

"The Ship Building Industry of the United States and Its Relation to the Foreign Trade" is the title of a document just issued by the treasury bureau of statistics. It discusses the economic conditions which surround the present state of the ship building industry in this country in both their historical and their industrial aspects. Historically it finds that the use of ironclads in the civil war sounded the doom of wooden ships as instruments of national defense, and thenceforth turned over maritime ascendancy to the iron-producing nations, in which Great Britain had then held the leadership. But with the ascendancy of the United States in iron and steel production and the advent of this country into the new era of oceanic responsibility, both commercially and politically, the present period of our maritime progress is clearly marked off from all that has preceded it.

Historically our development in ship building has reached the point at which the economic outlook is based upon the most favorable industrial and commercial conditions ever known in the history of our merchant marine. These conditions are shown first in the internal development of the ship building industry. The influence of the naval policy on merchant ship building has developed ship building plants to a point of equipment with tools and machinery, and to a scale of production which, with a larger demand for ships, would almost put the best American ship builders on the same plane as British ship builders as to cost of production. The use of electricity in the operation of ship building plants, the employment of pneumatic tools and the services of cranes and derricks in handling heavy materials at every stage have revolutionized ship making methods in the United States to such an extent that the best ship yards in America are even better equipped than those of Europe. The chief obstacle to ship building in competition with foreign ship builders is the lack of sufficient orders at our ship yards to keep them busy on a sufficiently uniform volume of work.

The difference in the labor cost of production in foreign and American ship yards is conceded to be about 25 per cent. greater on the hull and 50 per cent. greater on the machinery in the American yard. This difference —if accepted as correct—it is held, must be overcome by the introduction of piece work methods of labor and the standardizing of types and parts. The report finds that as compared with British ships, comparatively little progress has been made in this country in either of these respects, except in the yards located upon the great lakes. The lake ship yards have turned out a volume of tonnage of a kind which has enabled them to utilize European methods of reducing cost more generally than is the case on the Atlantic seaboard. Lake ships, especially the freighters, are nine times out of ten of about the same model. The progress on the lakes in productive economics has also arisen largely from consolidation of plants, whereby specializing could be more generally developed and uniformity in type of construction introduced. The consolidation of ship building plants with steel-making establishments seems to be another direction in which economics in productive cost of ships must be realized. Ship builders complain that the fluctuation of prices in the steel market have been among the greatest hindrances to the development of steel ship building in the United States, as compared with European prices, which are more stable.

The second part of the inquiry is devoted to the study of the merchant marine as a part of the national distributive system. It cites the fact shown by statistics that with the growth in the volume of ocean commerce an increasing proportion of our surplus wealth has been handled by sea, so that the national interest has been forced to avail itself of agencies not of its own control in order to reach and maintain foreign markets, subject to the discrimination of shipping lines organized in the service of our competitors. The growth in the volume of our foreign commerce is mainly responsible for the fact that American capital has practically overcome its timidity for investment in either ship building or shipping. Under existing conditions, however, distribution by sea between the United States and the outside world is in foreign control. For the fiscal year ending June 30, 1900, imports and exports by sea aggregated $2,089,528,666, only 9.3 per cent. of which value was carried in American vessels. Numerous tables are given, showing the growth in our foreign commerce and the decline in our foreign shipping.

NOTES OF SMALL VESSELS BUILDING IN LAKE YARDS.

Information in the large tables in the last issue of the Review dealing with ship building on the great lakes is quite complete, but there are a number of small vessels under construction that were not mentioned in the tables.

The Racine Boat Mnfg. Co. of Racine, Wis., has under way some twenty gasoline launches of $1,000 to $4,000 value each, as well as a large number of pleasure craft of a smaller kind which they are constantly building.

Rieboldt, Wolter & Co., who build wooden vessels at Sturgeon Bay, Wis., have no new vessels under way, but they are making extensive repairs on the wooden steamers Albert Soper, Philetus Sawyer and Marshall F. Butters.

John Inglis & Sons of Toronto, Ont., are building engines and boilers for the steel freight and passenger steamer which the Collingwood Ship Building Co. of Collingwood, Ont., is constructing for the Northwest Trans. Co. of Sarnia, Ont. The engines are to be triple expansion with cylinders of 26, 42 and 70 in. diameter and 42 in. stroke and the boilers are to be four Scotch of 12½ ft. diameter and 12 ft. length, allowed 175 lbs. pressure.

Wm. Hingston & Son of Buffalo are building at Jacksonville, Fla., in connection with their operations with Hughes Bros. & Bangs, of New York, a very large dipper dredge (15 yards) and five bottom dump scows. The dredge is to cost about $175,000. Power will be provided by two single engines furnished with steam from water-tube boilers. The dump scows are to cost about $30,000 each.

Wm. Marlton of Goderich, Ont., is building for the Dominion Fish Co. two tugs each of 70 ft. length and to cost $5,000. Engines are being built by the Goderich Engine Co.

CONSTRUCTION OF TORPEDO BOATS AND DESTROYERS.

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PREFACE.

It is not my intention to enter into an elaborate discussion of the entire work covered by the above title, but to compare some of the practical ideas already in use and to deduce conclusions as to the best methods employed; with practice we make perfect, and it is to the practice of the past we must look to make perfect in the future. With this end in view, it seems not an unwise plan to spread abroad some of the work extant—to bring about discussion, and with discussion the natural tendency toward improvement along the lines with which we have to deal.

To the ship builder, the naval architect, the draftsman, and to the man in the workshop or in the yard, a comparison of the various methods employed in a certain class of ship work is a great help; it tends to bring together the best efforts of ingenious men and inventive minds, evolved in different places and times, into a compact form. This, no doubt, will be a great improvement over the present method, a method which is both tedious and bulky, if carried out properly—I refer to the practice of individual "data-gathering." This is undoubtedly highly commendable and that man is the most valuable who can command the greatest amount of "stored-up" knowledge, together with his professional ability.

In lieu of this voluminous method, I propose to substitute a single volume. devoted to the best thoughts and efforts coming under my own observation. This will be an incentive for numerous works and criticisms along these lines, out of which will grow the more nearly perfect work of the future.

There is no doubt that numerous mistakes have been made and errors committed, not only in the types of boats this volume will treat of, but also in the larger classes, by a lack of comparison and closer investigation of the various methods employed in hull construction and fittings in the past.

This country has had the benefit of the years of experience of England, France, Russia and Germany, together with the fact of having built nearly thirty-five torpedo boats and sixteen destroyers. This knowledge gained abroad and at home, added to that learned by the various maneuvers and tests as to the efficiency of all classes, should undoubtedly give us, in the future, a boat unequalled and unexcelled.

In this work it is not my purpose to venture into the realm of the designer, or to make suggestions along that line, except as they come in contact, or conflict with, the best methods of construction. The main idea is to bring out the various parts of the boats, as they would appear in the specifications, and treat the methods of construction employed in each individual case.

From my personal observation I find that there are varied ideas as to the best methods to employ in the construction of the keel, transverse frames, scantlings, longitudinals and transverse bulkheads, all of which demand the best ideas. In the arrangement of the decks, the disposition of hatches, ladders, lockers and tables; in the proper arrangement of the quarters and living spaces—that part of any ship upon which the critical eye rests—in the most advantageous stowage of movable articles along the upper deck; all of these and more constitute food for the best thoughts and suggestions, and still admit of vast room for improvement. With all the foregoing to be thought of and carefully worked out, the smaller details—fittings which give the finishing touches to any boat—must have ample room for consideration. These details really demand more time and care than those which have been cited, in that they are so numerous and conspicuous. The hand and awning rails, which can make or mar a boat, the hatch fittings, boat gear, ammunition gear, anchor arrangement, deck and side lights; all these tend to show the amount of care and consideration given to their construction.

The experienced man will readily see and appreciate the value of all these points. He knows the numerous critical eyes which will scan his efforts, and he understands with what far-reaching credit a well-designed and well-constructed boat will endow him, and vice versa. These boats come under the careful scrutiny of the experts of all nations, and as a medium of advertising are unexcelled. Lack of space precludes my citing many instances where notoriety of this character has been gained.

When all of these things are taken into consideration it can be clearly seen that great care, thought and time should be employed in investigations, comparisons and the like—everything to put a boat before the public and professional eye which is as nearly perfect as it is possible to make her.

STEM.

Although the stem does not enter into the first stages of a boat's construction, it is placed in the front rank of the items coming under our notice, and it generally precedes all the other subjects in the specifications of boats to be built. In boats of this type, the stem is not an element of any great structural strength; it suffices if it insures local stiffness and makes good connection with the keel and shell plating. The lightest section possible is generally used. In some cases the entire stem is made of hammered scrap iron, and in others the lower portion is made of cast steel and the two parts scarfed. In the former case the section at the top is rectangular with a rabbet deep enough for the shell plating. This section continues throughout that portion above the water line and for some distance below it. A gradual increase in width then commences with a gradual decrease in thickness until it makes connection with the flat keel plates, at which point it has assumed a flat, broad section, taking the shape of the keel plates. The same sections are used in the latter case, except in the lower portion, which is made a little thicker and heavier. This method has the advantage of being cheaper, as it does not require a difficult forging, the upper portion of the stem being made of a rolled bar and the lower part a steel casting.

In the earlier types of boats built, the turtle-back deck was an important feature, and still remains so in some of the later destroyers. In some of these cases the stem stops at the under side of the deck plating, but in others it extends above the deck and a small bulwark is carried aft from it about 3 ft. This bulwark has no special advantages, but has some great disadvantages, one of which is the difficulty of fitting a suitable hawse pipe to obtain a straight lead for the anchor hawsers and towing lines.

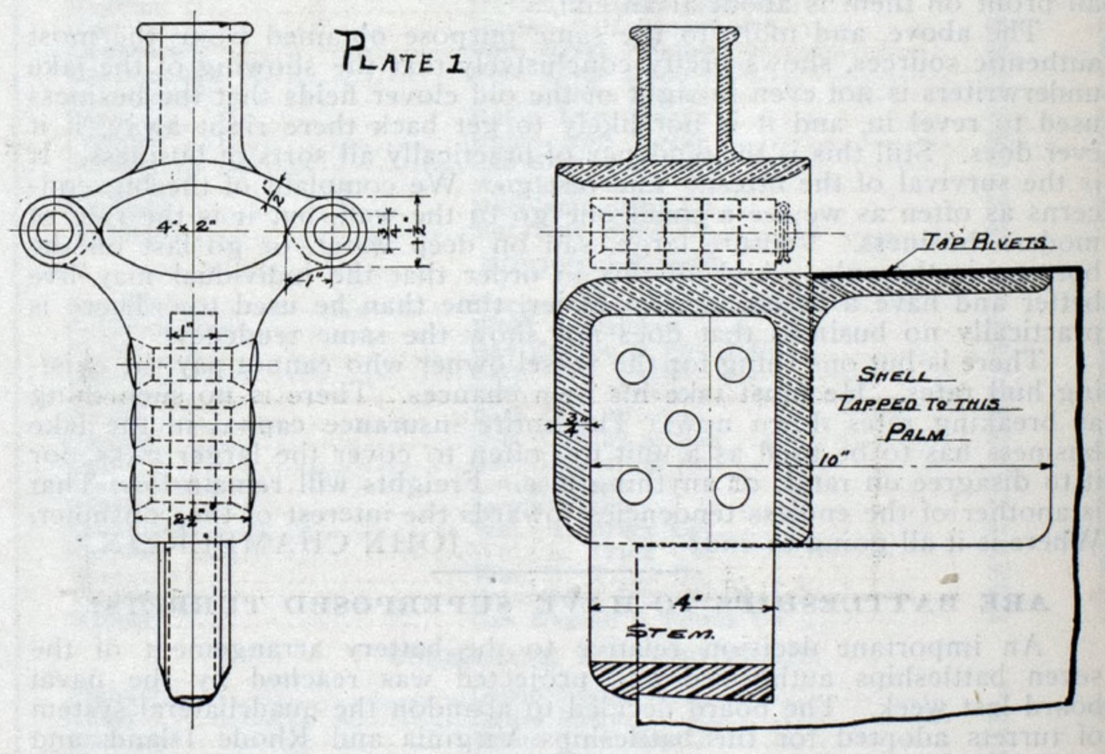
Note—The author is indebted to Joseph C. Wilson for the accompanying sketches.

These difficulties are important enough to warrant an extensive investigation as to whether they cannot be overcome and a better arrangement devised. In the boats having the stem stop under the turtle deck a very satisfactory scheme, although far from perfect, was employed to overcome these difficulties. On top of the stem was fitted a composition casting with palms extending back on the deck and down on each side to connect with the shell. The casting was made in the shape of a circular hawse pipe with a bell mouth on the forward side. The hole was made large enough to allow two anchor or towing hawsers to pass through. This method, although answering the purpose, is considered by some rather a makeshift, and is not deemed sufficiently strong in its connections to the surrounding structure. The connections to the shell and deck are not very extensive, and to make them so a great increase in weight would be entailed, besides having a very bulky casting.

To obviate this and to meet the various conditions, I would call attention to sketch No. 1, in which I propose to practically embody the above ideas in the stem itself. From a glance it will be seen that the stem forms the main support of the bow casting, with the deck and shell contributing a supplementary support. This casting to extend down on both sides of the stem for a distance of about 5 in. and to be well riveted to it by countersunk head and point rivets. The casting will conform to the shape of the stem, rabbet included, thus insuring no additional expense in the forging. It will be noticed that the casting is made of sufficient thickness to secure ample stiffness and strength. The main portion is carried back of the stem and at that point is reduced in thickness, extending (as shown) inside of the shell and under the deck plating. The connection to the shell and deck are made by rivets where possible and by taps elsewhere.

The sketch shows the upper part of the casting hinged to facilitate the entering of hawsers, cables, etc., and adds much to its value. The hinging can be done from either side, as it is merely a question of removing a countersunk toggle pin. As both sides are made up of a series of lugs working on a ¾-in. pin, the strength is well maintained. The hinged part, having little or no wear upon it and taking very few of the strains, can be decreased in thickness, as shown. On the upper half is shown a socket to receive the flag staff or rail connections.

PLATE 1



The reasons for elaborating on a detail of this character are sufficient to warrant it. It was learned by experience during the Spanish war that some of the boats, when at anchor in a seaway with the wind blowing in one direction and the tide running another, were all the time troubled, either with the anchor hawser crossing the bow or being nipped at the fairlead in the bulwarks. One of the boats lost two anchors in a single night by having her hawsers cut from this cause, although only a moderate breeze was blowing, with very little sea on.

STEM, KEELS AND LONGITUDINALS.

As everything must have a beginning, the most natural part of a boat to comment upon at the outset is her keel, stem and stern. The keel, an important element in the structural strength upon which so many of the longitudinal strains are borne, must necessarily demand considerable attention. To know the best mode of construction a proper idea of its functions must be had. It is without doubt one of the principal members of almost any equivalent girder, both from the proportion of metal involved and from its extreme distance from the neutral axis. It is obvious therefore that the boat, having longitudinal strains such as are prominent on the crest of a wave, in the hollow thereof, or under the varying conditions of speed and stress of weather, is dependent upon the keel and its adjacent members to bear the greater part of the load.

It is understood, of course, that in the design of the keelsons of a boat the strains to be borne by the transverse framing must not be overlooked. The ideal condition must be arrived at in outlining its construction. The severest strains, however, to which ships are subjected are those tending to produce longitudinal bending, and therefore the greatest strength is required to prevent change of form in that direction.

The sketches shown below will give some idea of the various methods employed to gain the above ends. By taking each sketch and dissecting it the best results of comparison can be obtained. It will be seen by reference to sketch "A" that the intercostal style of keelson was employed in the construction of this vessel. This method allows continuous floors and transverse framing to be used, but seriously undermines the longitudinal strength. Intercostal work, whether it be keels or longitudinals, cannot be depended upon to be kept in a true line, unless some one of its members be made continuous. This must be done or else the work must have the most careful attention to secure proper alignment. This latter condition cannot be obtained in every ship yard. If the alignment be at all out

the efficiency of the keel in "sagging," a condition which is the most frequent and most dangerous, is materially reduced. This will be evident when the keel in compression is considered. To obtain the full value of this member when performing this function, metal must be in line with metal, plate in line with plate, not in a zigzag plane as would occur when out of line; this is one of the principal objections. Another objection is that the keel plates being intercostal and secured to the transverse floors by the vertical clips, there is no metal to rely upon when in tension, except the rivets in these clips. This condition will obtain more or less, at all times, and especially when the boat is on the crest of a wave.

This defect is remedied in the construction shown in sketch "B." Here the rivets in the clips act as additional strengthening to the vertical keel plate when in tension and materially aid it when under compression. In this type of keel construction the floor plates are scored out for the depth of the keelson and lap above it in the machinery spaces, as shown by the dotted lines in this sketch. At the ends of the boat the floors are in two pieces and are secured to the vertical keel by the angle clips and flanges of the plates, as shown by the solid lines. This gives a continuity of metal in the longitudinal member at a point farthest away from the neutral axis—a condition much to be desired.

The increased stiffness of this arrangement can be seen at a glance, while the important additions to the longitudinal strength are very apparent. The fore-and-aft angles at the bottom and top of the keelson, together with the keel plate, form this addition, whereas in the former case there was nothing in this direction. As in sketch "A," the vertical clips form rigid connections between the keel and the transverse framing, while the connection to the hull is amply taken care of by the two fore-and-aft angles mentioned. Where the floor plates are not too large they can be in one piece and a score made for the keelson by punching. In the larger plates it is cheaper to lap them above the keel, as shown by the dotted lines in sketch "B."

In sketch "C" is shown an entirely different style of keel construction, and while it is used on some types of boats it would hardly be available for the larger torpedo boats or destroyers. This method of construction has one feature to recommend it and that is its comparative cheapness. As can readily be seen, it is formed by running an I beam of varying sizes on top of continuous floor plates, to which it is connected by angle clips and by the reverse bar or flange of the floor plate. The size of this I beam section is 5x3x3 in. by 10 lbs. amidships, reduced at the ends to 4x2⅝x2⅝ in. by 7½ lbs. At the extreme ends it was continued in an inverted T bar section 3x3 in. by 6½ lbs. In the wake of the engine space this beam was omitted in the center of the ship, but its place was taken by two channel bars of 4x2x2 in. by 8 lbs., spread apart so as to form the boundary and supporting bars of the engine bed plate.

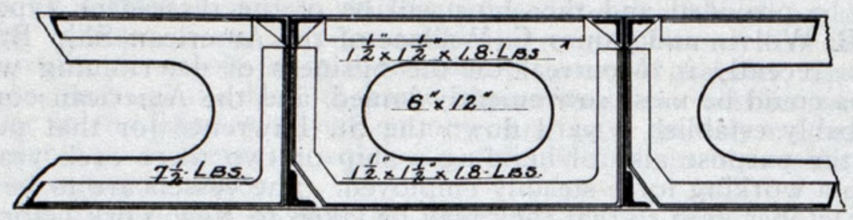
The boats on which this type of keel construction was used had but one engine, thus enabling the employment of this method. This practice is no doubt very good for boats of this size and displacement, 100 ft. and 65 tons respectively, but it can hardly be called the best practice when the principal longitudinal member is brought nearer to the neutral axis, and so few connections to floors provided.

As regards the various connections of the vertical keel to its adjacent members and the connections at the butts of the different plates and angles there remains so much to be said that but little will be attempted in these columns. The fore-and-aft continuous angles at the top and bottom of the vertical keelson should be well strapped by a bosom angle, and a good shift of butts made with each other, as well as with the surrounding work. For a certain length forward, where the cross section at the keel assumes a U shape the bars at the bottom must necessarily be omitted. It is impossible to make a good riveting job in this case. In some cases nothing was substituted, but where it is desired a substitute can be made of a forging or light casting, shaped as shown in sketch "D." This enables the vertical to be riveted to it, and the flat keel plates to be well tapped to it, thus insuring a good stiff connection. The butts of the vertical keel plate are connected by a double butt strap, treble-riveted and extending from the lower to the upper angle. This makes a rigid connection and guarantees the reinforcing of the longitudinal strength.

As to the connections between the floors and keelson, they must be of ample strength to insure the transmission of all the strains to the various members involved, and the angles or flanges forming these connections should be well fitted and driven up.

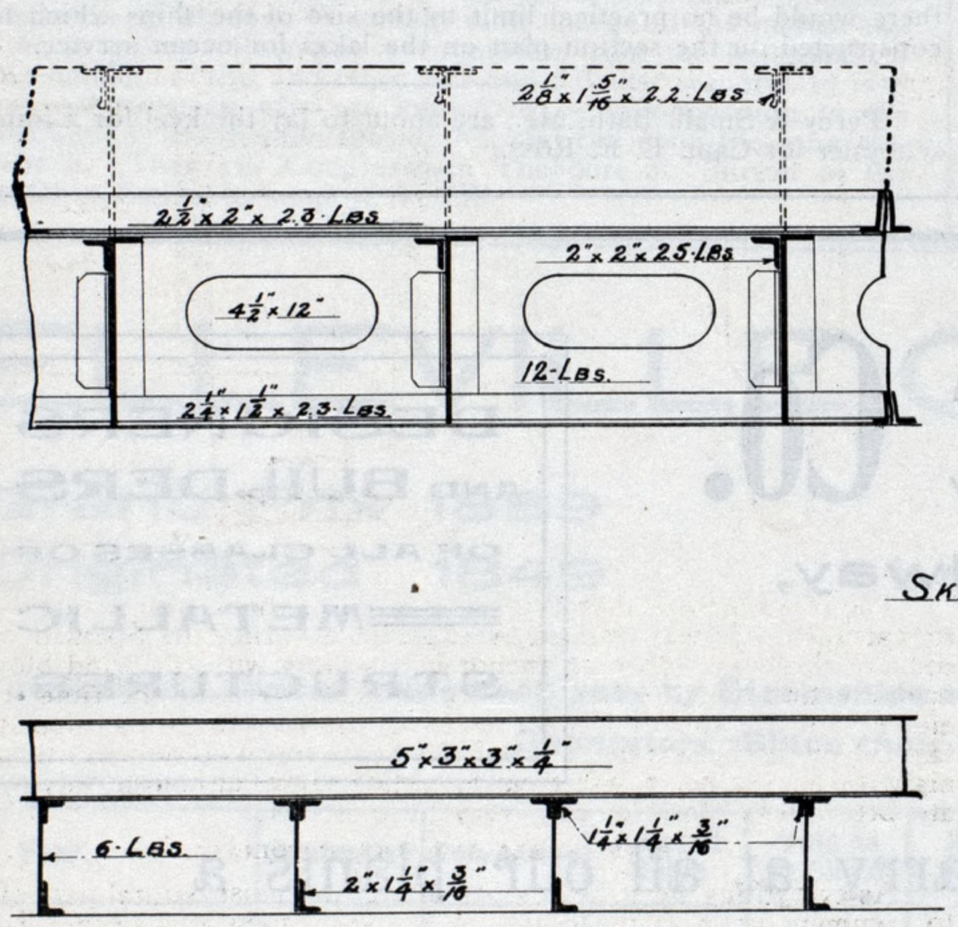
PLATE 2.

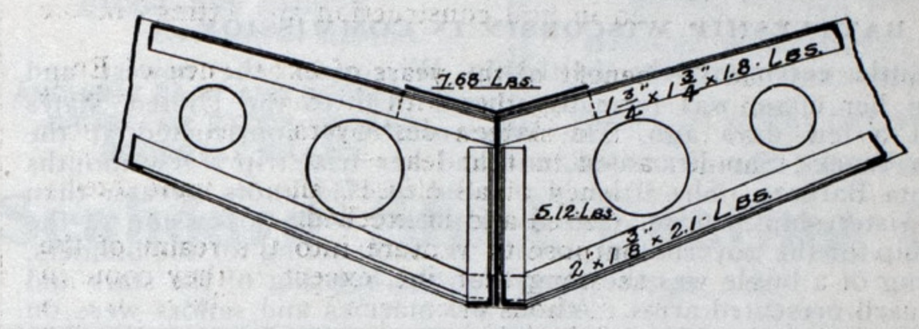
SKETCH "A."

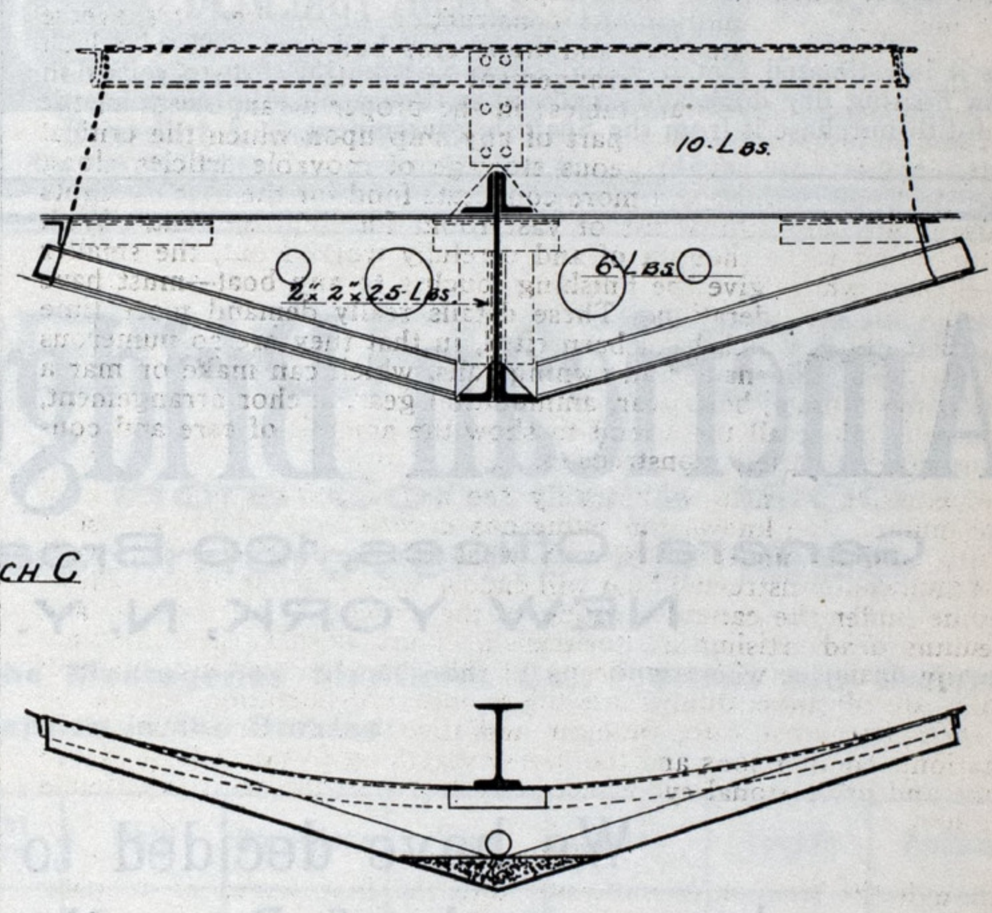


SKETCH "B."

SKETCH "C"







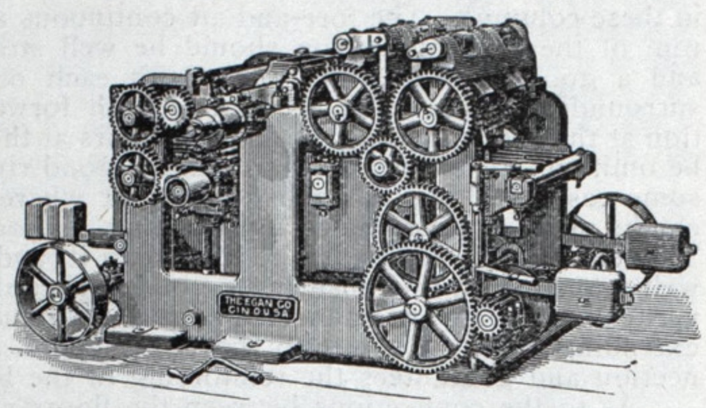
Of the three sketches shown it seems that the one marked "B" is the most favorable for consideration. As this type meets all of the theoretical requirements involved, and as it is undoubtedly the easiest in construction (except sketch "C," which will be disregarded), and consequently the cheapest to erect, it must necessarily be selected for future use. I would therefore suggest that this method of construction be followed in all boats of this type.

Although only a small portion of the ground has been covered, a very valuable and important feature has been discussed, and it remains to the following articles to build up as good structure upon the "backbone" which has been created in this. The article will be devoted to some comments upon the additional longitudinal framing used in these boats.

On Wednesday and Thursday last New York harbor was almost closed to navigation. On the New York side of North river the thick ice and ice floes made it practically impossible to navigate side-wheel steamers and some of the paddle ferry boats were fast in the ice for hours at a time. Few boats could reach their wharves. The large transatlantic liners had to be almost surrounded with tug boats and some of the loaded steamers worked for hours before being able to make a passage for themselves. While such great trouble was being experienced in New York harbor, it is surprising to know that hardly any ice was visible on the Thames river, Conn., and the wonderful Kennebec river in Maine. These rivers never freeze over, and considering the location, especially the Kennebec river, this is a remarkable fact.

PATENT NEW DOUBLE-CYLINDER SURFACER.

A good planer for planing hardwood lumber is sure to be of great advantage in any first-class factory. There is presented herewith a cut of a newly designed and improved machine, patented Dec. 19, 1899, that will plane both sides of hardwood lumber 30 in. wide and up to 12 in. thick. This machine has broken rolls, and each section is center-geared. Two or more pieces of unequal thickness may be placed over it at the same time. The lower head comes almost directly under the top, and can be drawn clear out of the machine for sharpening and re-setting the knives.



This machine also has an automatic device for raising and lowering the bed for different thickness of material, by means of four screws at each corner, and can be instantly started or stopped by a lever convenient to the operator. It is one of the most powerful machines made, and will stand up to do very fine and accurate work. It is recommended to wood-workers wanting a first-class double-cylinder planer for hardwood. The manufacturers of this planer, J. A. Fay & Egan Co., of Nos. 325 to 345 West Front street, Cincinnati, O., will be pleased to furnish any of our readers who may be interested full particulars and lowest prices on application, and will also forward their large new illustrated hanger free.

BATTLESHIP WISCONSIN IN COMMISSION.

With little ceremony the battleship Wisconsin, the newest and speediest of her class, was formally turned over to the United States government a few days ago. The Wisconsin was constructed at the Union Iron Works, San Francisco, and had her trial trip a few months ago off Santa Barbara. She attained a speed of 17½ knots, greater than any of her sister ships. Capt. George H. Reiter took possession of the new battleship for the government, Irving M. Scott acting for the builders. The sounding of a bugle was the signal for the hoisting of the stars and stripes, a guard presented arms. About 300 marines and sailors were on board, in addition to a number of invited guests. Capt. Reiter is from the Philadelphia, which he commanded for some time. The Wisconsin will probably be ready for sea in two weeks and then she will go south for drill and target practice.

As it is estimated that it would require about $500,000 to repair the Havana floating dry dock and to tow it to Pensacola, the navy has decided not to purchase it from the Spanish government.

LAKE-BUILT SHIPS FOR OCEAN SERVICE.

One of the revolutionary departures of ship building during the past year and which gives ample evidence of becoming a permanent occupation is the active competition of the lake ship builders for the construction of ocean vessels. Ten steel steam vessels under construction in lake yards for salt-water service were described in the last issue of the Review. Eight of them are of dimensions that will admit of passage through the St. Lawrence canals, and two, to be taken to the coast in two parts, are to be capable of carrying on the deep ocean draught 7,000 gross tons with 1,000 tons bunker capacity. Seven of these ten vessels for the sea are being built by the American Ship Building Co. and three by the Craig Ship Building Co. of Toledo, which in the past two or three years has built four or five such ships. The steel steamers Paraguay and Asuncion were the forerunners of a fleet from the American Ship Building Co. that are distinctly constructed for salt water service. Vessels have been built on the lakes, which in times of depression have sought coast trade, but these two vessels were built to meet the requirements of salt water navigation. These two steamships, as well as two steel barges for consorts, are owned by the International Steamship Co., of which A. B. Wolvin of Duluth is president. They are of the following dimensions: Length over all, 256 ft.; length of keel, 242 ft.; breadth, molded, 42 ft.; depth, molded, 26 ft. 6 in. The engines are of quadruple expansion type, having cylinders of 15, 23, 35 and 54 in. diameter with a common stroke of 36 in. and are supplied with steam from two Babcock & Wilcox water-tube boilers, having a pressure of 250 lbs. Following the lake custom the engines are located aft. The eight other steamers of Canadian canal dimensions now on the stocks at lake yards are in most respects similar to the Paraguay and Asuncion. Full particulars of these vessels, as well as names of owners, etc., will be found in the table above referred to.

The two steamers of 7,000 tons capacity each that are to be taken to the seaboard in halves are building for eastern capitalists, represented by Charles E. & W. F. Peck of New York. Their dimensions are to be 430 ft. keel, 450 ft. over all, 43 ft. beam and 35 ft. deep. A 5-ft. water bottom will be provided and the ships will be of the three-deck type. Messrs. A. B. Wolvin and James C. Wallace of the American Ship Building Co. were recently in Montreal on the business of determining where these ships could be most conveniently joined, and the American company will probably establish a yard down the St. Lawrence for that purpose and for the purpose also of building a ship or two there each year so as to keep a working force steadily employed. The vessels are to be completed by October next so that they may be taken to New York before the close of navigation. They are big enough to go to any part of the world. They are up to the limit of breadth of ships which may pass through the canal—43 ft. Were it not for this limitation of breadth in the canal there would be no practical limit to the size of the ships which might be constructed on the section plan on the lakes for ocean service.

Percy & Small, Bath, Me., are about to lay the keel for a four-masted schooner for Capt. E. E. Ross.

American Bridge Co.

General Offices, 100 Broadway,
NEW YORK, N. Y.

DESIGNERS AND BUILDERS OF ALL CLASSES OF METALLIC STRUCTURES.

We have decided to carry at all our plants a large stock of Raw Material, from which we can furnish with great promptness any ordinary order for Steel Bridges, Roofs, Buildings, Columns, Girders, Beams, Channels, Angles, Plates, etc., etc.

BRANCH OFFICES and WORKS:

ALBANY, N. Y.
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BOSTON, MASS.
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BUTTE, MONT.
CANTON, OHIO.
CHICAGO, ILL.
CLEVELAND, O.
COLUMBUS, OHIO.
DENVER, COLO.
DULUTH, MINN.
EAST BERLIN, CONN.
ELMIRA, N. Y.
GROTON, N. Y.
HORSEHEADS, N. Y.
LAFAYETTE, IND.
LONDON, ENG.
MILWAUKEE, WIS.
MINNEAPOLIS, MINN.
NEW ORLEANS, LA.
PENCOYD, PA.
PHILADELPHIA, PA.
PITTSBURG, PA.
ROCHESTER, N. Y.
SALT LAKE CITY, UTAH.
SAN FRANCISCO, CAL.
SEATTLE, WASH.
SIDNEY, N. S. W.
TRENTON, N. J.
WILMINGTON, DEL.
YOUNGSTOWN, O.

AN ADDRESS ON THE SHIPPING BILL.

Capt. Charles Campbell of the Marine Industrial League, New York, addressed the employes of the American Ship Building Co. at Cleveland last week upon the subject of the shipping bill. About 1,000 workmen attended. Capt. Campbell spoke in part as follows:

"I am not here in the interest of any politicians or political parties, but solely in the interest of the Marine Industrial League, an organization made up exclusively of those interested in the construction, handling and running of vessels. After a long and hard struggle for the recovery of our lost carrying trade over seas, we came to the conclusion that the Frye-Grosvenor bill, now being so thoroughly discussed in the senate of the United States and by the press in general throughout the country, although not all that fancy paints it, is the best legislation possible for us to get at present. The question of who is to receive the greater share of the suggested $9,000,000 appropriation, which is the maximum limit under the bill, is not a question to be discussed by those who earn their living as employes of the ship builders or owners. That is a battle that they must fight between themselves. Suffice it for us that our needs require the construction of ships to give us employment. That a subsidy is necessary there is no question, as that is the only available means by which we can compete against foreign countries. The high seas are a public highway, governed only by international laws. No legislation that we might enact similar to the protection given to industries ashore within the confines of the United States could prevent foreign competitors from paralleling our lines, no matter to what foreign ports we might run them. With part of their fixed charges assured them by their various governments, the foreign carriers are in a position to underbid the lowest freight rates we might mention that would guarantee us the smallest margin of profit.

"Having traveled both coasts and the various lake ports in gathering data relative to this question, I am in a position to state positively that the greatest opponents of the suggested legislation for the revival of our marine are the emissaries of foreign ship owners, whose death knell would be rung as the carriers of our foreign trade, the very moment that any law beneficial to the American marine was placed upon our statutes. They have taken advantage of the lack of knowledge on matters marine possessed by those in the interior of our country, and have grossly misrepresented and denounced everyone with patriotism enough in his makeup to fight for the national honor."

At the conclusion of the address, Howard Saunders, one of the employes, presented a set of resolutions prepared by Richard T. Cooney, for the approval of the meeting, which were unanimously indorsed. As the representatives of the league were compelled to leave to fulfill other engagements elsewhere, Thomas Fitzgerald took charge of the matter and suggested the propriety of sending a committee from the boilermakers and iron ship builders of this and other lake and Atlantic seaports, to visit their various congressmen who are known to be in opposition to the bill. The resolutions indorse the subsidy bill and call upon the congressmen to favor it. They ask Congressman Theodore E. Burton of the twenty-first Ohio district to support the bill.

SHIP YARD NOTES.

Mr. Martin Saunders of San Francisco, Cal., has placed an order with E. Cousins of Gray's Harbor, Wash., for a four-masted schooner with a capacity of 1,000,000 ft. of lumber.

Albert R. Budd, the coal operator, who recently started in business on the Monongahela river, will let a contract for a new towboat in a few days.

H. M. Bean of Camden, Me., is at work on a four-master of 800 tons and is about to lay the keel of a five-master of 2,000 tons. He says there is prospect of building a seven-master late in the season.

From one end of the Pacific coast to the other there is greater activity in ship building than has ever been known. The builders claim that they are unable to supply the demand. At the Hay and Wright, Bendixen and Hall ship yards there is more work on the ways than can be completed within the year. At Hall's yard at Port Blakesley three vessels are ready for launching and the keels of four more have been laid within the week. The first to be launched will be the barkentine James Tuft destined for the Mexican coast trade. Next will come a schooner for the lumber trade along the northern coast, which will have a capacity of 1,300,000 ft.

"Seaboard Steel Castings."

MANUFACTURERS OF
"THE ADMIRAL" ANCHOR.

THE LATEST AND BEST STOCKLESS ANCHOR.
APPROVED BY LLOYD'S.

ANCHORS CAST AND TESTED ON ORDER, OR STOCK ORDERS PROMPTLY FILLED.

A GUARANTEE OF QUALITY.

OPEN-HEARTH STEEL CASTINGS OF THE HIGHEST GRADE.
FACILITIES FOR CASTINGS UP TO 80 000 POUNDS WEIGHT.
MACHINE WORK AND PATTERNS FURNISHED WHEN REQUIRED.
RAIL OR WATER DELIVERIES.
CAPACITY, 1500 TONS PER MONTH.

Seaboard Steel Casting Co.,
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"BENEDICT-NICKEL" SEAMLESS TUBING
FOR CONDENSER TUBES

Contains NO ZINC nor any weakening metal.
Send for Booklet with treatise on "Electrolysis of Condenser Tubes."

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BELLEVILLE GENERATORS

Grand Prix 1889
Originated 1849

Hors Concours 1900
Latest Improvements 1896

Number of Marine Leagues made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australian	Polynesien	Armand Behic	Ville de la Ciotat	Ernest Simons	Chili	Cordillere	Laos	Indus	Tonkin	Annam
1890	22,576	820									
1891	22,749	22,777	68								
1892	22,749	22,801	23,274	7,753							
1893	22,793	22,781	22,762	22,749							
1894	22,813	22,789	22,858	22,813	12,567						
1895	22,891	22,922	22,913	22,936	13,629	9,571					
1896	23,178	30,906	23,232	23,183	20,735	21,051	13,572				
1897	22,750	23,202	30,912	23,185	20,745	25,370	21,119	14,382			
1898	23,646	23,178	23,184	23,199	20,842	21,080	21,080	20,851	21,318	7,569	
1899	23,178	23,205	22,477	30,135	20,082	20,926	20,956	17,448	18,285	14,669	7,628
Total	229,323	215,381	191,680	175,953	108,600	97,998	76,727	52,681	39,603	22,238	7,628

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.
WORKS AND YARDS OF L'ERMITAGE ST. DENIS (SEINE), FRANCE.
TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT DENIS, SUR SEINE.

PARKER STEAM GENERATOR.

The Parker Engine Co. of California, owners of the Parker steam generator, with home offices No. 123 Crocker building, San Francisco, and general office and sales department in the Drexel building, Philadelphia, have just issued a catalogue devoted to a description of their generator. The Parker regenerative system of steam making is now in use and is giving general satisfaction. The aim is to combine the economizer and boiler in one compact and simple apparatus, securing the same or better economy with less trouble, less space occupied and less first cost; to maintain a positive flow of the water and steam within the tubes, always in one direction, insuring the tubes permanently against the fire and securing absolute safety; to provide free release for the steam and to eliminate the effects of bad water, hard firing and falling pressures, doing away entirely with foaming, priming or lifting of the water under all conditions of operation. The company announces in a circular to steam users that this advance in boiler practice will admit of specifications including, in addition to the usual tensile and hydrostatic tests, the following trial conditions: Evaporation 11.5 lbs. where 10.5 lbs. is usually specified; priming, foaming, or lifting to be impossible, and moisture in steam not to exceed 1 per cent. under any conditions; to stand forcing to 50 per cent. above rating to date of acceptance, without leaks, or above 10 per cent. loss in economy; quick changes between no load and full load, or sudden drops in pressure from any cause; and in no case shall the circulation be reversed, the tubes over-heated, or the water lifted; ground hand-hole joints to be made tight without bolts; internal cleaning to be accomplished without shutting down and without the use of mechanical cleaners.

VALUE OF STOCKS—LEADING IRON AND STEEL INDUSTRIALS.

Quotations furnished by HERBERT WRIGHT & Co., Cleveland,
Date of February 13, 1901.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire	53¼	53½	50¾	50⅞
American Steel & Wire, Pfd	94	94	93¼	93¼
Federal Steel	53¼	53¼	50	50½
Federal Steel, Pfd	82	82	80	80⅜
National Steel	48	48	46¼	46⅝
National Steel, Pfd	95¼	96	94½	95¼
American Tin Plate	66	66¼	64⅛	64⅛
American Tin Plate, Pfd	92⅛	.....	.....	92⅛
American Steel Hoop	31	31¼	30	30
American Steel Hoop, Pfd	77	77	76	76
Republic Iron & Steel	16⅞	17	16½	16½
Republic Iron & Steel, Pfd	63	64	62	62

U. S. Engineer Office, 1637 Indiana Ave., Chicago, Ill., February 4, 1901. Sealed proposals for dredging in Chicago Harbor will be received until 12 noon, central time, March 12, 1901, and then publicly opened. Information furnished on application. J. H. Willard, Maj., Eng'rs. Feb. 28.

U. S. Engineer Office, St. Augustine, Fla., Jan. 26, 1901. Sealed proposals for building and equipping a steel hull, stern wheel, combined dredge and snagboat will be received here until 12 noon, Mar. 7, 1901, and then publicly opened. Information furnished on application. C. H. McKinstry, Capt., Engrs. Feb. 21.

Ahead of our Competitors.

That is what our customers say: With raw materials unequalled, with proficient chemical knowledge, technical skill and accuracy in manufacture, and with the best known machinery the superiority of

GARLOCK PACKINGS

naturally follows and its high reputation is merited. It is all carefully inspected and must be superior in quality and accurate in measurement, before shipment. Every pound is fresh and fully guaranteed. If you have never used GARLOCK PACKINGS your patronage is particularly solicited for a small trial order.

Send for catalogue and samples to our nearest office.

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NONE GENUINE — TRADE Garlock MARK — WITHOUT IT.

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Boston. Pittsburg. Denver.
Chicago. Cleveland. San Francisco.

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KNOWN AND USED WHEREVER STEEL SHIPS ARE BUILT.

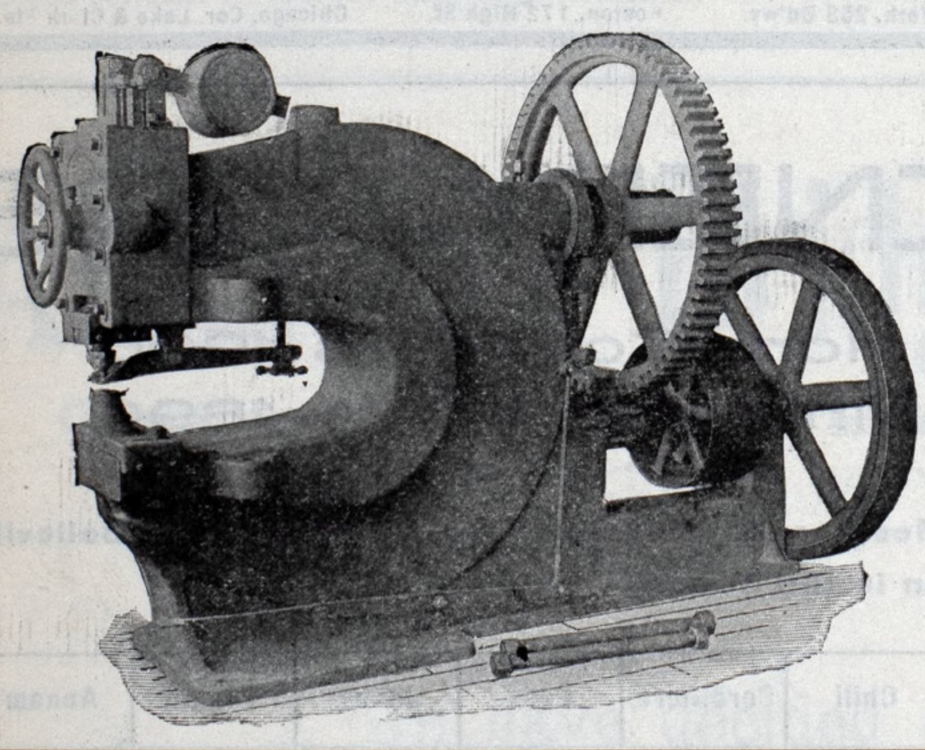
SEPARATE VOLUMES FOR PLATES.

"Ship Building in Iron and Steel."
(Plates in separate volume.) $5.25.

"Ship Building and Laying Off."
(Plates in separate volume.) $3.00.

"Theoretical Naval Architecture."
(Plates in separate volume.) $3.50.

THE MARINE REVIEW PUB. CO.,
CLEVELAND.



THIS ILLUSTRATES OUR

Standard Boiler Maker's Punch

which is similar to our iron worker's punch with the exception that it is equipped with a plain jaw instead of an architectural jaw. We believe that this is the best punch for boiler makers on the market to-day, and for strength, reliability, and beauty of design we think it is unequaled. We can refer you to hundreds of the largest shops all over the world where we have installed one or more of these tools, and where they are giving the best of satisfaction and service.

Let us hear from you if you are in the market for a tool of this kind. We think we can interest you both as regards quality and price.

THE CLEVELAND PUNCH & SHEAR WORKS CO.,
CLEVELAND, O., U. S. A.

FREIGHT AND PASSENGER STEAMER

A. B. Taylor is for sale. Vessel 103 ft. long, 22 ft. beam. Freight capacity, 115 tons; passengers, 200. Electric light; good sea boat; speed, 11 miles; economical. E. C. Dunbar, Grand Haven, Mich. Mar. 7

MARINE FIRE BOX BOILER FOR SALE.

Allowed 116 lbs. pressure. Diameter, 8 ft.; length, 13½ ft. Hardy & Dischinger, Toledo, Ohio. Feb. 14

WELLAND CANAL SIZE STEAMERS WANTED.

Will charter two steamers for season of 1901 and would like privilege of purchase. Must have a speed of not less than 10 miles an hour, and must be in first-class condition. Send full particulars to Box 476, The Marine Review Pub. Co., Cleveland, O. Feb. 14.

LUMBER CARRIERS FOR SALE.

Stmr. White Star	capacity	350,000 feet.
Barge Eva S. Robinson	"	560,000 "
Schr. Annie P. Grover	"	340,000 "
Schr. John Miner	"	350,000 "

All A2 and A2½ and in good condition. Arthur B. Slyfield, Port Huron, Mich. Feb. 21.

ENGINE AND BOILER.

Wanted—Fore-and-aft compound engine with high pressure cylinder of about 12 in. and stroke of about 16 in.; also boiler suited to furnish steam for 14x14 in. engine and allowed steam pressure of not less than 125 lbs. in accordance with United States inspection. Address Box 386, Cape Vincent, N. Y. Feb. 14.

FOUNDRY AND MACHINE SHOP FOR SALE.

To close an estate. Located in one of the large cities on the lakes. Long established, well equipped, doing good business, marine and general. Splendid chance for the right parties. Will sell plant or lease for a term of years. Address "Administrator," care Marine Review Pub. Co., Perry-Payne Bldg., Cleveland. tf.

TUG FOR SALE.

Good Tug, six years old. Engines 18x20. Boiler allowed 130 pounds steam pressure. Address Box 284, Ashland, Wis. Feb. 28.

FIVE ELECTRIC PASSENGER LAUNCHES FOR SALE.

In fine condition. Length over all, 35 feet. Seating capacity, 28. Send for price list. Yacht brokers, please note. Milwaukee Electric Launch Co., 1504 Monadnock Block, Chicago. tf